Factors Affecting Patient Perceptions of Quality and Health-Seeking Behavior

FACTORS AFFECTING PATIENT PERCEPTIONS OF QUALITY AND HEALTH-SEEKING BEHAVIOR

OSONDU R. S. OGBUOJI

A Dissertation Submitted to the Faculty of

The Harvard T. H. Chan School of Public Health

in Partial Fulfilment of the Requirements

for the Degree of *Doctor of Science*

in the Department of Global Health and Population

Harvard University

Boston, Massachusetts

March, 2018

Dissertation Advisor: Dr. Rifat Atun Osondu R. S. Ogbuoji

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Abstract

In this dissertation, I address three issues related to patient-perceived quality of care: the impact of switching to the new World Health Organization (WHO) HIV treatment guidelines on patient perception of quality of care, the impact of rolling-out a quality improvement (QI) training intervention on mothers' perception of the quality of postnatal care, and the association between patient perceptions of quality and their decisions to bypass healthcare facilities for care. Chapter one presents an overview as well as key insights form all three papers.

In chapter two, I investigated the impact of early access to antiretroviral therapy (ART) versus national standard of care on patient satisfaction using data from a stepped-wedge cluster randomized controlled trial in Swaziland. The outcomes of interest included, patient ratings of perceptions of overall quality of care, wait time, consultation time, level of involvement in treatment decision-making, and respect received from the health worker. The results show no evidence of a causal impact of early initiation of ART on patient perception of overall quality of care, or perception of quality of care in the other domains measured. The results also showed a time trend of increasing negative perception of quality as the study progressed.

In chapter three, I investigated the impact of a quality improvement training intervention on women's perception of the quality of postnatal care using data from a stepped-wedge cluster randomized controlled trial in primary health care (PHC) clinics in rural South Africa. Results show no evidence of a causal impact of the QI training on patient perception of quality of postnatal care

in any of the domains assessed. The results also showed time trends with increasing positive perception of quality over time in three out of the five domains assessed: patient-provider communication, consultation-time, and level of involvement in treatment decision making.

In chapter four, I explored the associations between perceptions of quality of antenatal care and sick-child care on patients' decisions to bypass healthcare facilities in nine low- and middle-income countries. The results showed that measures of structural quality were more consistent predictors of patients' bypassing behavior compared to measures of technical quality.

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Acknowledgements

I would like to start by thanking the members of my dissertation committee – Rifat Atun, Till Bårnighausen, Joshua A. Salomon, and Margaret E. Kruk. Rifat served as my dissertation chair in the last lap of my research. He helped to shape my work and general approach to research by pushing me to always ask how the details fit into the larger picture. Till was my initial dissertation chair until he left Harvard for Heidelberg university. He introduced me to different areas of HIV and health systems research, and was instrumental to my development of skills in quantitative research methods, and causal analysis. Josh helped to nurture my interest in the general field of decision sciences and in the select area of choice modelling. He helped me think through knotty research issues and always provided a listening ear. Margaret provided the foundation I needed in quality of healthcare research, and her contributions improved this work significantly. I am grateful for all the support, mentorship, and friendships of all the members of my committee, and I look forward to continuing this relationship further.

I would also like to thank other collaborators on the studies presented in this dissertation – MaxART trial consortium, MONARCH trial team, Hannah Leslie from the Harvard Quality Research Lab, and many others who helped me develop, think through, or implement the analyses in this dissertation.

I would like to thank the organizations that provided funding to enable me devote more time to research during my stay at Harvard – the Harvard Presidential Fellows Scholarship, the Harvard T. H. Chan School of Public Health, the Harvard Department of Global Health and Population, the Harvard Maternal Health Taskforce, and the Horowitz foundation for social policy.

I would like to thank the fellow students who made life at Harvard more interesting – Angela Chang, Iyrna Postolovska, Ellen Moscoe, Alex Radunsky, Mahesh Karra, Aksher Saxena, and

Noah Haber within my cohort, and many others outside my cohort and department. In addition, I would like to thank the Global Health and Population education office, Barbara Heil, Allison Gallant, and Anjanee Jaimungal (while she was here) for being so supportive and reminding me of crucial deadlines. Also, I would like to thank my other academic mentors and collaborators for providing a wide range of learning opportunities – Wafaie Fauwzi, Michael Reich, Thomas Bossert, Stephen Resch, Jesse Bump, Stéphane Verguet, Norman Daniels and the GHP community. To all of you, thanks for being generous with encouragement, counsel, and advise at various stages of my study.

I would also like to thank Dr. Barry Smith, and Dr. Iko Ibanga for believing in me and encouraging me to pursue a mid-career doctoral program, Pastors Tunde and Tinu Olorunwumi and the RCCG Cambridge family for making it easy to settle into life in Boston.

I would like to thank my family for being there all the way. But for God's grace and the strong bonds we share, we would not have pulled through the trying times when we lost both Papas and patriarchs of Ogbuoji and Anakwe families – Pastor Onyiba Nnnachi Ogbuoji, and Chief Emmanuel Anakwe.

To my dear wife, Rachel, you are a rare gem and I am most blessed to be your husband. I truly would not have achieved this without you. I love you more than words can tell, and I am grateful for the sacrifices you made for this to happen. To my awesome, beautiful, angels – Chiamaka, Ifunanyachukwu, and Awele – you three make life interesting. Your smiles and the joy you bring to our home made it easy to pull through the tough times. I am also thankful for my siblings, their families, and other close family members: Akin and Chichi Ogunlade, Ebenezer and Nnnena Ogbuoji, Elias and Amara Ogbuoji, Sam and Tochi Eze, Olayinka and Quintyne Lowe, Denvard and Genevieve Charles, Akachi and Chichi Ogbuoji, Jones and Celestina Okorie, Kesta Anakwe, and Junior Anakwe – to all of you and your families, thanks for your encouragement and support throughout this process. It takes a village to succeed and you all are my village. To my uncle, Senator Sonni Ogbuoji, thank you for everything. Words cannot express my heartfelt gratitude for all you did to make this happen and for being the father figure to our extended family since Daddy's passing.

I would also like to thank my dearest mum (Pastor Maureen Ogbuoji) and mother-in-law (Dr. Augustina Anakwe) for the love, support, and encouragement that only mothers can give. You two epitomize a strength of character that is not common today and I am forever proud of you.

Finally, I would like to dedicate this to the memory of my father (Pastor Onyiba Nnachi Ogbuoji 1946 – 2014) and to my mother Pastor Maureen Ogbuoji. I am the person I am today in large part because of you two. Your strength, love for people, insistence on doing the right thing, and high moral standards always challenge me to be a better person. You both prioritized people over possessions, love over hate, selflessness over self-interest, and a love for God over everything else. Dad, your passing is the most difficult thing I have had to deal with, but watching Mama pull through has been a miracle that reminds me that nothing is impossible. Mama, you are truly the strongest person I know of. I hope that, like both of you, I would be able to set worthy examples for others.

But for God's grace and mercies, I would not be crossing this milestone. I am very mindful of the fact that many who shared similar dreams/goals could have had this opportunity in my stead but did not, and for that, I am eternally grateful. I hope that in some way, I would be able to improve the lives of others in return.

Chapter One:

Dissertation Overview

1.1 Introduction

In order to ensure optimal utilization of available health services, policy makers must understand what factors influence patients' perceptions of quality, and how the patients' perceptions of quality influence their health seeking behaviors. These relationships are not often predictable and may differ depending on the type of health service, the patient population, and the service delivery context. In the absence of reliable evidence, decision makers in resource-poor settings either have to rely on evidence from other contexts, practice 'trial and error' approaches, or rely on 'gut feelings'; none of which produce ideal results. Each of the three studies in this dissertation addresses a policy-relevant question related to patients' perceptions of healthcare quality in specific low- and middle-income countries. In two of the chapters, I describe the results from randomized controlled trials that explored the causal impact of specific policy changes on levels of patients' perception of the quality of their healthcare. In the third chapter, I describe results from a multi-country analysis of the relationship between perceived quality of healthcare and patients' decisions to bypass health care facilities when seeking antenatal care or acute care for a sick child. All three studies adopt rigorous quantitative methods to provide evidence needed to support decision-making in relation to policy and practice within important service delivery contexts such as HIV/AIDS, antenatal, postnatal, and integrated management of childhood illnesses (IMCI).

1.2 Patient-perceived Quality of Care

At the core of the questions addressed in this dissertation is the concept of subjective assessment of healthcare quality by patients, or patient-perceived quality of care. Although there is a generally accepted understanding that this concept implies quality assessment from the patient's perspective, existing studies are replete with ambiguous use of these terms, hence the need for organizing frameworks. The confusion is made even worse by the combined use of certain terms such as patient satisfaction, patient perceptions, perceived quality, and patient experience, to mention a few. This dissertation addresses questions across multiple aspects of perceived quality and therefore will benefit from the use of an organizing framework. I will not try to propose a harmonizing framework for all aspects of quality perceptions. Rather I will explore more deeply, certain aspects of quality perceptions, how they are influenced by upstream factors (such as policy changes), and how they in-turn influence downstream factors (such as behavioral intent and/or health facility choice). To this end, it is important to highlight some important frameworks in the current literature.

1.2.1 Models of patient-perceived quality of care

Current literature contains several proposed frameworks for subjective assessment of quality of healthcare arising from service marketing and health service research literature. Of these, the most relevant framework from the service marketing literature is Pai and Cherry's model of patient-perceived hospital service quality (1), while the most relevant model from the health service research literature is Sofaer et. al's framework of patients' perception of quality (2). Other include Zastowny's patient experience model (3), Linda-Pelz's theory of patient satisfaction (4), the generic SERVQUAL framework (5), and SERVQUAL adaptation for healthcare by Babakus and Mangold (6).

In the framework proposed by Pai and Chary for assessing patient-perceived hospital service quality, a patient's subjective assessment of a health service in one or more of nine dimensions of hospital care directly influences the patient's perception of service quality, which in-turn, affects the patient's perception of care received. The nine dimensions of hospital service quality listed include 1) the health facility's physical environment (healthscape), 2) health facility personnel, 3) health facility image, 4) trustworthiness, 5) clinical care processes, 6) communication, 7) relationships, 8) personalization, and 9) administrative processes. This model builds upon the generic SERVQUAL models for measuring quality of any service (5, 6).

The Sofaer et. al. model (2) makes a distinction between patient expectations and patient perception of quality. On the one hand, patient expectations occur before service is received (ex-ante) and are influenced by multiple factors including previous experiences, sociocultural norms, reputation of the provider, personal characteristics of the patient, etc. On the other hand, perception of quality occurs after service is received (ex-post) and is a combination of a patient's expectations with a patient's actual experience of care, measured against a set of individual quality standards held by the patient. In this model, patient care experiences play a role in forming both expectations as well as perceptions of quality. While the current experience of index care plays a role in influencing patient perceptions, it has no influence on patient expectations. By contrast, previous experiences (or self or others) primarily influence perceptions of quality through their effect on expectations. The model also identifies six different domains of quality arising from patient centered care research. They include 1) access, 2) communication and information, 3) courtesy and emotional support, 4) efficiency/effectiveness of care, 5) technical quality, and 6) Structure and facilities.

This dissertation will adopt Sofaer et. al's model of perceived quality of care as an analytic framework for the different studies. In the next section, I would summarize the different studies in this dissertation.

1.3 First Study: Impact of Early Access to ARVs for All (EAAA) vs. Standard of Care on patient satisfaction

In the first study, I investigated the impact of a population-wide introduction of Early Access to Antiretrovirals for All (EAAA) on levels of patient perception of quality of HIV healthcare in Swaziland. This policy allowed for immediate commencement of antiretroviral medication after testing positive to a HIV test and is in line with the revised World Health Organization (WHO) guidelines on Antiretroviral treatment (ART) (7-9). Evidence from earlier randomized controlled trials showed that immediate access to ART reduced the transmission potential of HIV-positive individuals (10, 11). It is therefore expected that introducing this policy to the entire population would substantially reduce rates of HIV transmission at the population level. In addition, some believe that commencing patients on ART immediately after testing positive for HIV would improve patient satisfaction, as patients no longer have to wait for their health condition to deteriorate before commencing treatment. However, there are also concerns that EAAA could have negative effects on patient satisfaction through several mechanisms. First, it is not clear that all patients will react positively to immediate commencement of ART upon testing positive; the emotional and psychological stress of having to deal with the bad news of a HIV infection and the prospect of lifelong care may be too much to bear for some and therefore cause some level of dissatisfaction. Second, EAAA would change the population composition of individuals currently on ART, as people in earlier stages of HIV infection who have not developed severe symptoms would now be on care. These people, unlike those who commenced ART in later stages, would not have the experience of recovering from HIV and yet be exposed to the side-effects of treatment. Therefore, they may be more likely to feel dissatisfied with their care. Hence, in order to explore these issues, we conducted a stepped-wedge cluster randomized controlled trial (n=2,629) in 14 health facilities in Swaziland. Our study assessed the impact of EAAA on patient perception of quality of care measured across six different domains: overall quality of care, wait time, consultation time, level of involvement in treatment decisions, and respect received from health workers. Each of the fourteen health facilities in the study was randomized to commence EAAA in one of six steps. We collected data on patient satisfaction from patients seeking HIV care from the health facilities at baseline, end line, and at each transition step. Satisfaction was assessed using a five-point Likert scale

(1 = Very Good, 2 = Good, 3 = Indifferent, 4 = Bad, and 5 = Very Bad) and we conducted our analysis using statistical methods recommended for the analysis of stepped-wedge trials with cross-sectional data.

The results of this analysis suggested that EAAA had no significant impact on patient perception of overall quality of care or perception of any of the other domains of healthcare quality measured. The proportional odds ratio of comparing EAAA to standard of care were 0.91 (95% CI: 0.66, 1.25) for perception of overall quality of care, 1.04 (95% CI: 0.61, 1.78) for perception of quality of wait time, 0.9 (95% CI: 0.62, 1.31) for perception of quality of the level of involvement in treatment decisions, 0.86 (95% CI: 0.61, 1.20) for perception of quality of consultation time, and 1.35 (95% CI: 0.93, 1.96) for perception of the level of respect received from the health workers.

These null findings have important policy implications because, as already explained, EAAA could have influenced patient satisfaction in positive or negative ways. The results of this study suggest that changes in patient satisfaction – and their consequences – should not be considered a barrier to introducing public EAAA policies. However, as patient numbers receiving ART increase following the implementation of EAAA, and the demand on the health system increases, satisfaction levels should be monitored to ensure they do not decline in the longer term and adversely affect adherence to ART.

1.4 Second Study: Impact of Quality Improvement (QI) on patient perception of quality of postnatal care

In the second study, I explored the impact of a quality improvement (QI) intervention on patient perception of the quality of postnatal care. In South Africa, the government made quality improvement a cornerstone of its healthcare strategic plan and as a result embarked on a process to incorporate quality improvement interventions into various healthcare services (12, 13). As is common with most QI interventions, success is often measured by the impact of QI on objective measures of quality and less frequently by the impact on subjective measures of quality such as patient satisfaction. Yet we know that a patient's perception of, and perception of the quality of health care received determines future use of the same healthcare services (14-16). Though we expect QI interventions to have a positive impact on patient satisfaction, it is also possible for it to have a negative impact on patient satisfaction – e.g. through unintended effects such as longer wait times arising from provision of more comprehensive care to each patient, or reallocation of human resources from a less visible service (e.g. postnatal care) to a more visible service (e.g. antenatal care).

Against this background, we conducted a stepped-wedge cluster randomized controlled trial (n=1,066) to investigate the causal impact of QI on maternal perception of the quality of postnatal healthcare services in Hlabisa sub-district, KwaZulu-Natal, South Africa. Each of the seven primary healthcare clinics (PHC) enrolled in the study was randomized to transition from control to QI intervention in one of six study steps. The QI intervention focused on providing training of PHC staff on the implementation of the QI approach and staff were left to determines QI goals within the maternal newborn children and women's healthcare (MNCWH) service continuum. We collected data on patient perception of postnatal healthcare quality at six-week postnatal care clinics, with satisfaction measured on a five-point Likert scale, and analyzed the data with a mixed-effects ordinal logistic regression models.

The results of the study showed that QI did not have a statistically significant impact on patient perception of postnatal care in any dimension of quality measured. The odds ratios were 1.05 (95% CI: 0.62, 1.77; $p = 0.868$) for perception of overall quality of care, 1.06 (95% CI: 0.62, 1.81; $p = 0.818$) for wait time, 1.10 (95% CI: 0.71, 1.69; $p = 0.669$) for communication, 1.18 (95% CI: 0.51, 2.71; $p = 0.698$) for consultation time with provider, 0.97 (95% CI: 0.55, 1.71; $p = 0.911$) for level of involvement in treatment decisions, and 0.96 (95% CI: 0.59, 1.57; $p = 0.882$) for respect received from the health workers. In addition, the results showed a trend of improving patient satisfaction as time progressed in the study for four dimensions of quality (overall quality, communication, involvement in treatment decisions, and consultation time), but not for two (wait time, and respect).

These results suggest that QI interventions in MNCWH services did not significantly affect patient perception of postnatal care. However, the presence of time trends suggests that there might be other factors influencing satisfaction. First, it may be that the commencement of the study may have signaled to all PHC clinics involved that QI was important and staff may have improved the quality of service they offered without a formal QI intervention. Second, it is also possible that the act of measuring patient satisfaction may have introduced Hawthorne effects, such that staff feel their activities are being monitored and therefore improve the quality of the services they provide (17). A third potential cause could be communication that may have occurred between PHC clinic staff outside the control of the study. This may have happened through regularly scheduled administrative meetings at the department of health or at the supervising hospital. Although steps were taken by this study to limit those interactions, the interactions were not eliminated entirely and may have become viable communication channels. Regardless of the potential mechanisms, the presence of these findings indicates the existence of other factors beyond the QI activities that should be explored as tools for improving patient perception of the quality of postnatal care services.

1.5 Third Study: Bypassing health facilities for antenatal and sick-child care: do expectations of quality matter?

In the third study, I explored the associations between patients' perceptions of quality and their decisions to bypass healthcare facilities for antenatal care and acute care for a sick child. It is known that the expectations a patient has about the quality of healthcare they will receive at a particular health facility, influences their decision to seek care at that facility or not (18-21). However, it is less clear what measures of quality factor into patients' perceptions of quality, or if the relationship between perceptions of quality is similar across health services or geographical locations. Earlier studies exploring this question have focused on a particular health service or a limited geographical location within a country with interesting results (22-26). In this study, we build upon earlier work, and take advantage of Service Provision Assessment (SPA) data across nine low- and middle-income countries to address the question for two services: antenatal care (a preventive service) and acute care for a sick child provided through integrated management of childhood illness (IMCI) clinics (a curative service). SPA data include health facility assessments, direct observation of patient-provider interactions and patient exit interviews for several services including ANC and IMCI. For each service, we conducted multilevel analyses to assess the odds of being a bypasser in a particular health facility based on several individual-level and facility-level variables. We defined a bypasser as patient or caregiver answering no to the question "is this the closest health facility to your home?". We created a health facility technical quality index from patient-provider observations, and an index of structural quality based on WHO's General Service Readiness Index (GSRI) (27).

The results from this study showed that for both ANC and IMCI, health facility GSRI was significantly associated with bypassing but health facility technical quality was not. The results also showed that certain health facility characteristics such as hospital (vs. non-hospitals) or privately-owned (vs. government-owned) were significantly associated with bypassing. These findings suggest that patient expectations of quality may be largely driven by visible factors, such as facility characteristics, and less by technical factors, such as the effectiveness or the content of care provided. The findings also suggest that patients may adopt proxy measures of quality in making decisions on where to seek care. These proxies may include health facility labels such as "hospital", "government-owned", or "privately-owned", and serve as an important signal of expected quality at a particular health facility.

1.6 Citations

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2 Chapter Two:

Impact of early initiation versus national standard of care of antiretroviral therapy on patient satisfaction in Swaziland – a stepped-wedge cluster randomized controlled trial

Abstract

Background: Following the revision of guidelines for Anti-Retroviral Therapy (ART) by the World Health Organization in 2013 and 2016, many countries have progressively transitioned towards providing early access to ART for all (EAAA aka Treatment as Prevention). However, little is known about the effect this might have on patients already used to existing standards of care. On the one hand, EAAA could have a positive effect on patient satisfaction if patients place high value on the early onset of treatment which frees them from the psychological burden of waiting for symptoms to get worse before gaining access to treatment. On the other hand, EAAA could have a negative effect on satisfaction through 1) psychological and emotional burden of commencing lifelong treatment for HIV on the same day as diagnosis, 2) an indirect effect on satisfaction by causing significant increases in patient volume, which in turn, leads to less health worker time spent per patient, and longer queues, and 3) compositional changes to the patient population receiving ART as on average, the patients receiving ART under EAAA will be in the earlier stages of the disease (vs. standard of care) – the average ART patient under EAAA will thus be more likely to be healthier, suffer from very few or no HIV symptoms, and thus lack the experience of "coming back to health", which may be a powerful driver of positive HIV patient satisfaction. The objective of this study therefore, was to evaluate the causal impact of the introduction of EAAA on patient satisfaction.

Methods and findings: We conducted a seven-stepped-wedge cluster randomized controlled trial in 14 healthcare facilities in Swaziland's Hhohho region. The trial investigated the impact of EAAA on the following domains of patient satisfaction: overall quality of care, wait time, consultation time, level of involvement in treatment decisions, and respect received from the health worker. We measured satisfaction on a five-point Likert scale: 1 = Very Good, 2 = Good, 3 = Indifferent, 4 = Bad, and 5 = Very Bad. A total of 2,629 participants were sampled. The proportional odds ratio of comparing EAAA to control were 0.91 (95% CI: 0.66, 1.25) for perception of overall quality of care, 1.04 (95% CI: 0.61, 1.78) for wait time, 0.9 (95% CI: 0.62, 1.31) for involvement in treatment decisions, 0.86 (95% CI: 0.61, 1.20) for consultation time, and 1.35 (95% CI: 0.93, 1.96) for respect. For all domains of quality, we observed a trend with worsening patient satisfaction as the study progressed.

Conclusion We found no evidence of an impact of EAAA on patient satisfaction in all domains of quality assessed. This should allay concerns about the potential for the rapid increase in the numbers of people with HIV starting ART leading to higher service demand on the health system, with a decline in satisfaction, which could lead to decreased adherence or decreased retention occasioned by patient perceptions of EAAA. The study was registered at ClinicalTrials.gov (NCT02909218).

2.1 Introduction

Following the World Health Organization (WHO) revision of the guidelines for Anti-Retroviral Therapy (ART) in 2013 (1) and subsequently in 2015/2016 (2, 3), many countries have progressively transitioned towards an Early Access to ART for All strategy (EAAA, or 'Universal Test and Treat' or 'Treatment as Prevention'). The evidence from the HPTN052 trial (4, 5) and several HIV epidemiologic studies (6-9) provides the basis for the promise of achieving a fall in HIV incidence by adopting the EAAA strategy. These studies not only promise reductions in HIV incidence, but also provide arguments for the economic benefits that early access to testing and treatment could produce.

Missing from the current evidence on EAAA, however, is how it will affect the HIV patient's perception of the care received (10). In theory, EAAA could affect patient satisfaction in varied ways. It is possible that EAAA could have a positive effect on patient satisfaction if patients value the early onset of treatment which frees them from the psychological burden of delaying treatment while waiting for HIV disease to get worse. Conversely, it is also possible that EAAA could have a negative effect on patient satisfaction. For example, EAAA could have a direct effect on patient satisfaction through the psychological and emotional stress patients feel from being required to commit to life-long treatment with medications immediately after receiving a life-changing diagnosis like HIV. EAAA could also have an indirect effect on satisfaction by causing significant increases in patient volume, which in turn, could lead to less health worker time spent per patient, and longer queues. The increase in patient volume could also cause greater health worker stress, which could make them less respectful and friendly to patients. Another potential pathway through which EAAA might negatively affect average patient satisfaction is through compositional changes to the patient population receiving ART (11). Patients in later stages of HIV disease will be more likely to have the powerful experience of recovery and health improvement on HIV, while patients in earlier disease stages will be more likely to feel healthy when they start treatment. The main physical change following HIV treatment in patients in early disease stages may be the experience of HIV side effects. This difference in the distribution of recovery experience may lead to lower patient satisfaction under a EAAA policy.

If EAAA leads to lower patient satisfaction, it could have a significant negative impact on HIV treatment programs and the course of the HIV epidemic. Patient satisfaction is of intrinsic value. Ethicists and health policy researchers have argued that meeting patient expectations is an important goal of any health system; some view the subjective measure of patient satisfaction as a health systems objective that is equally important as the objective measure of population heath (12, 13). This sentiment is echoed in the current global push towards patient-centered care, which advocates for designing healthcare around the needs of patients while striving towards making patients satisfied with their care (14, 15).

In addition, patient satisfaction is of instrumental value through its effect on patients' behaviors. Patients who are dissatisfied with their care are more likely to disengage from care (16, 17) and to fail to reengage after disengagement for fear of negative health worker reactions (17, 18). Dissatisfied patients are also more likely to refuse or delay initiation of treatment (19) or become non-adherent to medications if already on treatment (16, 20). Taken together, these behavioral consequences of patient satisfaction could significantly affect the achievement of the UNAIDS 90-90-90 targets (21) and, as a result, change the trajectory of the HIV epidemic.

The Maximizing ART for Better Health and Zero New HIV Infections (MaxART) trial, a stepped-wedge cluster randomized controlled trial of EAAA in Swaziland, was designed to "quantify the causal impact of early access to ART for all on patient satisfaction" (22) as a pre-specified secondary endpoint with viral suppression and retention in care as primary endpoints. The trial investigated the impact of EAAA on the overall patient satisfaction, as well as four satisfaction subdomains (perception of wait time, consultation time, involvement in treatment decision-making, and respect received from the health worker). To our best knowledge, the results below are the first rigorous causal test of the hypothesis that EAAA changes patient satisfaction.

2.2 Methods

2.2.1 Trial design

We conducted a stepped-wedge cluster randomized controlled trial in public healthcare facilities in Swaziland's Hhohho region (Figure 2-1). Thirteen government clinics and one regional hospital (14 clusters in all) were each randomized to one of seven steps such that two clusters transitioned from the control to the intervention arm every four months (22). All health facilities (clusters) had open enrollment for HIV treatment for individuals aged 18 years and more, and so enrolled all eligible patients at the beginning of the study (month 1).

Ethical approval for the study was obtained from the Swaziland National Health Research Review Board in July 2014 (Reference Number: MH/599C/FWA 000 15267), and a non-human subjects research exemption was obtained from the Harvard Institutional Review Board as the team at Harvard only had access to de-identified data.

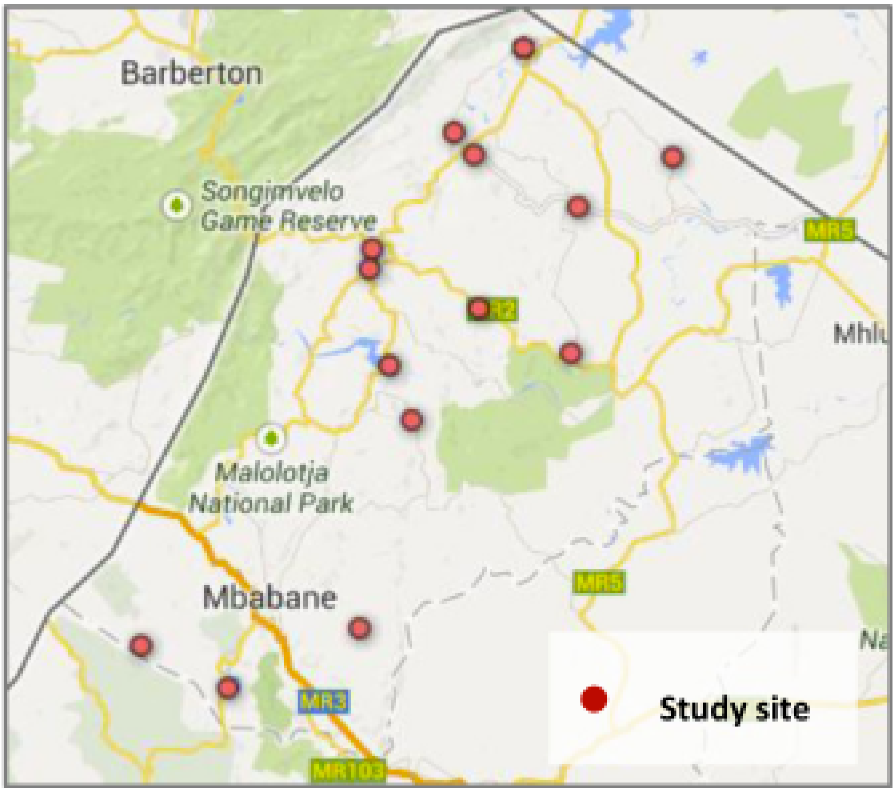

Figure 2-1. Map of Swaziland's Hhohho region indicating MaxART study sites

Every health facility started in the control phase (C), and at the beginning of each step, two health facilities transitioned to a four-month transition phase (T). During this phase, the health facility switched from using the existing HIV eligibility guidelines to the EAAA strategy. This process continued until all health facilities had successfully transitioned to the intervention stage (I) where EAAA was fully implemented (see Figure 2-2). Cross-sectional data were collected from patients visiting a facility on randomly selected clinic days during each step of the study.

	Months	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
STEPS	Step 7	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	T	T	T	T	I	I	I	I
	Step 6	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	T	T	T	T	I	I	I	I	I	I	I	I
	Step 5	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	T	T	T	T	I	I	I	I	I	I	I	I	I	I	I	I
	Step 4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	T	T	T	T	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	Step 3	C	C	C	C	C	C	C	C	C	C	C	C	T	T	T	T	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	Step 2	C	C	C	C	C	C	C	C	T	T	T	T	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	Step 1	C	C	C	C	T	T	T	T	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
		Baseline				Step 1				Step 2				Step 3				Step 4				Step 5				Step 6				Step 7				Endline			

C = Control (i.e. standard of care), **T** = Transition (i.e. commencement of EAAA), **I** = Intervention (i.e. full implementation of EAAA).

Each study step was originally designed to last for four calendar months but some accommodations were made during study implementation to account for holidays and for logistics reasons.

Figure 2-2. MaxART stepped-wedge study design

2.2.2 Participants

All HIV-positive patients aged 18 years and more who visit any of the 14 health facilities in Hhohho were eligible for inclusion in this study. Pregnant and breastfeeding women were excluded, as well as patients with any type of condition that could impede the informed consent process. Informed consent was obtained from all patients before they were enrolled in the study.

2.2.3 Interventions

The primary intervention of the study was implementation of the EAAA strategy. This strategy involved providing immediate access to HIV treatment for all HIV-positive patients in public-sector clinics. Health facilities in the control arm operated the standard of care which determined treatment eligibility based on prevailing guidelines: CD4 count <500/ml or WHO HIV clinical stage 3 or 4.

Participants who visited clinics in the control (C) phase were enrolled in ART if they had a CD4 count below 350 cells/µl, and later, below 500 cells/µl), or on pre-ART if they were HIV positive but not eligible for ART. During the transition (T) phase, all HIV positive patients visiting the clinic for the first time were automatically enrolled on ART after a session of counselling, while patients who were pre-enrolled on pre-ART were transitioned to ART on their next visit. In the Intervention phase, all HIV-positive patients are automatically given ART.

2.2.4 Outcomes

Our main outcome of interest in this paper was patient satisfaction, which was pre-specified as a secondary outcome in the MaxART trial published protocol paper (22). Patient exit interviews were administered to patients to assess their perceptions of the overall quality of care they received as well as the quality of care they received on four different quality dimensions: wait time, time spent with the health worker, involvement in treatment decision-making, and respect received from health workers. Patients responded to each question by selecting the appropriate response on a Likert scale that ranged from "very good" to "very bad". The responses were then transformed to a 5-point scale from 1 to 5 with 1 = Very Good, 2 = Good, 3 = Indifferent, 4 = Bad, and 5 = Very Bad.

2.2.5 Sample size

A total of 2,629 patient interviews were carried out trained interviewers over the study period from September 2014 through August 2017. All patients were asked questions about overall patient satisfaction while a sub-sample of 701 patient interviews were conducted to measure perception of the four patient quality subdomains.

2.2.6 Randomization

Each of the 14 health facilities was assigned to one of seven different groups (two facilities per group). Each group was then randomized to transition from the control phase to the intervention phase at each step in the study. One group was excluded from randomization and assigned to the first transition step in order to synchronize with other arms of the study. Subsequently, each group of health facilities was randomly assigned to transition at each step but individual patients were free to attend any health facility of their choice. Health workers and study participants were blinded to the transition timing until it happened.

2.2.7 Statistical methods

To test the causal impact of EAAA on patient satisfaction, we fit two-level multilevel ordered logistic models with individuals at the first level and health facility (cluster) at the second level. In the base model, we regressed patient satisfaction on exposure to EAAA and controlled for potential time trends as recommended for repeated cross-sectional samples (23-25). As robustness checks, we also fit expanded models to control for certain additional factors such as time since ART diagnosis, and time since start of ART treatment. We repeated each process using perception of quality for each of the four sub-domains of quality as our outcome.

All models assume proportional odds (26) and follow the specification in equation 1 below.

$$Log\left(\frac{\Pr\left(y_{ijt} > m \mid X_{ijt}\right)}{\Pr\left(y_{ijt} \leq m \mid X_{ijt}\right)}\right) = \tau_m - \theta T_j + \delta_t + \beta X + u_j + \varepsilon_{ijt} \quad , \qquad (1)$$

where i indexes the individual, j indexes the cluster, and t indexes the step (time). m is a category with $(1 \leq m \leq 5)$, τ is the cut point for that category, θ is the treatment effect, T is a binary variable which takes the value 0 if facility is in the control phase and 1 if facility is in the EAAA phase. X is a vector of independent variables (including overall health, months since HIV diagnosis, and months since ARV started), β is a vector of logit coefficients, and δ represents the time-steps. $u_j \sim N(0, \sigma_u^2)$ represents cluster-level random effects, and $\varepsilon_{ijt} \sim N(0, \sigma_\varepsilon^2)$ represents individual error terms.

To test the robustness of the results for perception of overall quality of care, we fit a base model and several other models that controlled for important health-status variables with the potentials to influence patient satisfaction scores. These included factors such as overall health status, number of months on treatment, and number of months since HIV diagnosis.

2.3 Results

2.3.1 Patient characteristics

A total of 2,692 patient surveys were carried out. A comparison of patient characteristics by intervention and control group is provided in Table 2-1. The mean age of the entire study population was 38 years (SD 12) while the mean age for intervention and control groups were 38 (SD 12) and 38 (SD 12) respectively. 72% of the study population was women, while the percentage of women in intervention and control groups were 70% and 75% respectively. 55% of the overall population was married with no significant difference between intervention (54%) and control (56%) groups.

Table 2-1. Comparison of patient characteristics by EAAA and standard of care (control) periods

	Standard of Care (Control) (N = 1,131)	EAAA (Intervention) (N = 1,498)	Overall (N = 2,629)
Age (Mean, SD)	38.3 (11.8)	38.0 (11.9)	38.1 (11.9)
Demographics, n (%)			
Female	842 (74.7)	1,049 (70.2)	1891 (72)
Married	636 (56.2)	804 (53.7%)	1,440 (54.8)
Health Status, mean (SD)			
Overall Health (i.e. Quality of life in past 2 weeks) 1= very good, 5 = very bad	2.1 (0.95)	2.1 (0.94)	2.1 (0.94)
Months since HIV diagnosis	56.1 (42.8)	60.8 (45.8)	58.8 (44.6)
Months since started HIV Treatment	42.4 (36.8)	46.6 (40.5)	44.9 (39.1)
Has received ART in the past, n (%)	86 (8.3)	39 (2.7)	125 (5.1)
Patient Experience Scores, mean (SD)	(N = 1,116)	(N = 1465)	(N = 2,581)
Overall patient experience: 1 = very good, 5 = very bad	1.6 (0.7)	1.8 (0.7)	1.7 (0.7)
Patient Experience Sub-Domains: 1 = very good, 5 = very bad	(N = 294)	(N = 402)	(N = 696)
Wait time	2.3 (1.1)	2.4 (1.0)	2.3 (1.0)
Involvement in treatment decisions	1.7 (0.7)	1.8 (0.5)	1.7 (0.6)
Consultation time spent with healthcare provider	1.6 (0.7)	1.8 (0.5)	1.7 (0.6)
Respectful treatment by health workers	1.4 (0.6)	1.7 (0.6)	1.6 (0.6)

There were also no significant differences in health status variables. Mean quality of life was 2.1 (SD 0.94) for the entire study population and 2.1 (SD 0.94) and 2.1 (SD 0.95) for intervention and control arms respectively. The average number of months since HIV diagnosis was 59 (SD 45) for overall population, 61 (SD 46) for the intervention arm, and 56 (SD 43) for control arms. The average number of months since commencement of HIV treatment was 45 (SD 39) with no significant difference between intervention (Mean 47, SD 41) and control (Mean 42, SD 37) arms.

2.3.2 Outcomes and estimation

In general, patients were satisfied with the quality of care received throughout the study. On a scale of 1 to 5 (with 1 = very good, and 5 = very bad), the average perception of overall quality of care was 1.7 (SD 0.7), while perception of the other subdomains of quality were: 2.3 (SD 1.0) for wait time, 1.7 (SD 0.6) for level of involvement in treatment decisions, 1.7 (SD 0.6) for consultation time, and 1.6 (SD 0.6) for respect.

Table 2-2. Effect of Early Access to ART for All (EAAA) of HIV on patient perception of overall quality of care

	Model 1	Model 2	Model 3	Model 4
	Odds Ratio 95% CI p-value	**Odds Ratio 95% CI p-value**	**Odds Ratio 95% CI p-value**	**Odds Ratio 95% CI p-value**
Early Access to ART for All (EAAA)	0.91 0.66 to 1.25 0.559	0.98 0.71 to 1.34 0.877	0.98 0.71 to 1.35 0.897	0.97 0.69 to 1.34 0.836
Steps (ref: Baseline)				
Step 1	0.65 0.35 to 1.19 0.161	0.63 0.32 to 1.22 0.170	0.68 0.33 to 1.42 0.306	0.67 0.32 to 1.39 0.285
Step 2	1.40 0.82 to 2.39 0.221	1.32 0.73 to 2.39 0.366	1.33 0.65 to 2.70 0.435	1.31 0.64 to 2.69 0.455
Step 3	1.62 0.74 to 3.53 0.226	1.64 0.71 to 3.79 0.244	1.71 0.63 to 4.62 0.290	1.69 0.63 to 4.56 0.296
Step 4	1.80 0.83 to 3.91 0.136	1.98 0.89 to 4.40 0.092	1.98 0.79 to 4.95 0.143	1.95 0.77 to 4.90 0.157
Step 5	3.07 1.49 to 6.35 0.002	3.00 1.41 to 6.36 0.004	3.10 1.37 to 7.01 0.007	3.06 1.35 to 6.93 0.008
Step 6	3.89 2.06 to 7.34 <0.001	4.10 2.01 to 8.24 <0.001	4.31 1.85 to 10.05 0.001	4.30 1.83 to 10.11 0.001
Overall Health		2.04 1.83 to 2.27 <0.001	2.05 1.84 to 2.30 <0.001	2.05 1.83 to 2.30 <0.001
Months since ART started			0.99 0.99 to 0.99 0.042	0.99 0.99 to 0.99 <0.001
Months since HIV diagnosis				1.00 0.99 to 1.00 0.480

Table 2-2 (Continued). Effect of Early Access to ART for All (EAAA) of HIV on patient perception of overall quality of care

	Model 1	Model 2	Model 3	Model 4
	Odds Ratio 95% CI p-value	**Odds Ratio 95% CI p-value**	**Odds Ratio 95% CI p-value**	**Odds Ratio 95% CI p-value**
/cut1	0.42 -0.27 to 1.12	1.92 1.12 to 2.73	1.85 0.94 to 2.75	1.86 0.95 to 2.77
/cut2	3.67 2.86 to 4.47	5.45 4.48 to 6.41	5.43 4.35 to 6.52	5.45 4.36 to 6.54
/cut3	4.75 3.83 to 5.68	6.55 5.46 to 7.63	6.45 5.24 to 7.66	6.48 5.25 to 7.70
/cut4	6.6 5.61 to 7.60	8.38 7.32 to 9.45	8.29 7.08 to 9.50	8.3 7.10 to 9.50
Variance (Clusters)	0.03 0.01 to 0.11	0.05 0.02 to 0.14	0.06 0.02 to 0.14	0.05 0.02 to 0.13
Number of Observations	2581	2555	2350	2337

We did not find any significant effects of EAAA on patient satisfaction or on satisfaction in any of the subdomains of quality measured. We assumed proportional odds, therefore by viewing the changes in levels of satisfaction as cumulative, and by assuming a category level m (e.g., "Very good"), the resulting odds ratios are interpreted as comparing all the observations in groups greater than m to all the observations in groups less than or equal to m. As such, we did not find any statistically significant effects of EAAA on patient satisfaction or on satisfaction in any of the subdomains of quality. The odds ratio of comparing EAAA to control on overall patient satisfaction was 0.91 (95% CI: 0.66, 1.25, p = 0.559), for wait time (OR 1.04; 95% CI: 0.61, 1.78, p = 0.880), level of involvement in treatment decisions (OR 0.90; 95% CI: 0.62, 1.31; p = 0.595), consultation time (OR 0.86; 95% CI: 0.61, 1.20; p = 0.375), and level of respect received from health workers (OR 1.35; 95% CI: 0.93, 1.96; p = 0.114). Tables 2-2 and 2-3 show the main results.

Although we found no significant impact of EAAA on patient satisfaction, we observed a general trend over time: we found initial improvements in patient satisfaction in the first step after baseline, then a worsening of patient satisfaction in subsequent steps (steps 2 to 6) of the study, with the last steps having the worst scores. For all but one domain of quality, patients were less likely to report worse satisfaction in the first step compared to baseline: overall patient satisfaction (OR 0.65; 95% CI: 0.35, 1.19), wait time (OR 0.45; 95% CI 0.23, 0.91), involvement in treatment decisions (OR: 0.39; 95% CI: 0.19, 0.83), time spent with healthcare provider (OR 0.35; 95% CI: 0.18, 0.66), and respectful treatment from healthcare worker (OR 1.11; 95% CI: 0.35, 3.56). These suggest some early perceived improvements that may have accompanied the introduction of EAAA that may have been short-lived.

Table 2-3. Effect of Early Access to ART for All (EAAA) for HIV on patient perception of quality (sub-domains)

	Overall Quality	Wait Time	Treatment Decisions	Consultation Time	Respect
	Odds Ratio 95% CI p-value	Odds Ratio 95% CI p-value	Odds Ratio 95% CI p-value	Odds Ratio 95% CI p-value	Odds Ratio 95% CI p-value
Early Access to ART for All (EAAA)	0.91 0.66 to 1.25 0.559	1.04 0.61 to 1.78 0.880	0.9 0.62 to 1.31 0.595	0.86 0.61 to 1.20 0.375	1.35 0.93 to 1.96 0.114
Steps (ref: Baseline)					
Step 1	0.65 0.35 to 1.19 0.161	0.45 0.23 to 0.91 0.025	0.39 0.19 to 0.83 0.014	0.35 0.18 to 0.66 0.001	1.11 0.35 to 3.56 0.862
Step 2	1.40 0.82 to 2.39 0.221	0.53 0.29 to 0.96 0.037	0.68 0.27 to 1.73 0.422	2.28 1.28 to 4.04 0.005	1.90 0.64 to 5.64 0.249
Step 3	1.62 0.74 to 3.53 0.226	1.05 0.53 to 2.08 0.897	0.84 0.28 to 2.51 0.752	1.67 0.74 to 3.74 0.215	1.81 0.60 to 5.45 0.290
Step 4	1.80 0.83 to 3.91 0.136	0.75 0.42 to 1.37 0.354	1.27 0.44 to 3.69 0.657	2.59 1.27 to 5.30 0.009	1.77 0.58 to 5.46 0.317
Step 5	3.07 1.49 to 6.35 0.002	0.71 0.44 to 1.15 0.166	2.63 0.93 to 7.41 0.068	7.02 3.44 to 14.32 <0.001	3.98 1.23 to 12.84 0.021
Step 6	3.89 2.06 to 7.34 <0.001	0.92 0.43 to 1.95 0.827	2.58 1.00 to 6.65 0.050	6.00 3.19 to 11.16 <0.001	3.78 1.17 to 12.24 0.026

Table 2-3 (Continued). Effect of Early Access to ART for All (EAAA) for HIV on patient perception of quality (sub-domains)

	Overall Quality	Wait Time	Treatment Decisions	Consultation Time	Respect
	Odds Ratio 95% CI p-value	**Odds Ratio 95% CI p-value**	**Odds Ratio 95% CI p-value**	**Odds Ratio 95% CI p-value**	**Odds Ratio 95% CI p-value**
/cut1	0.42 -0.27 to 1.12	-1.56 -2.11 to -1.02	-0.35 -1.29 to 0.59	0.52 -0.12 to 1.15	1.01 -0.04, 2.06
/cut2	3.67 2.86 to 4.47	0.47 -0.11 to 1.04	3.3 2.38 to 4.23	4.13 3.62 to 4.63	4.53 3.37 to 5.69
/cut3	4.75 3.83 to 5.68	1.57 0.93 to 2.21	4.35 3.28 to 5.42	5.7 4.92 to 6.48	6.44 4.82 to 8.06
/cut4	6.6 5.61 to 7.60	3.18 2.37 to 4.00	-	-	7.13 4.72 to 9.55
Variance (Clusters)	0.03 0.01 to 0.11	0.14 0.06 to 0.32	2.48E-32 2.10E-35 to 2.92E-29	5.69E-35 1.01E-35 to 3.21E-34	0.01 9.66E-05 to 4.56E-01
Number of Observations	2,581	695	694	694	696

For overall patient satisfaction, after the initial improvement in patient satisfaction in step one of the study, the odds of comparing each successive step to baseline increased consistently from step 2 to step 6, but only became statistically significant in the last two steps: step 5 (OR 3.07; 95% CI: 1.49, 6.35) and step 6 (OR 3.89; 95% CI: 2.06, 7.34). This suggests that holding all other variables constant, the odds of having worse overall patient satisfaction compared to baseline, was 307 percent higher in step 5 and 389 percent higher in step 6. A similar pattern was seen for respectful treatment from healthcare provider. Although there was a pattern of increase in odds ratio of reporting worse satisfaction, only the last two steps were significantly different from the baseline: step 5 (OR 3.98; 95% CI: 1.23, 12.84) and step 6 (OR 3.78; 95% CI: 1.17, 12.24).

For patient perception of wait time, patients were less likely to report worse satisfaction in step 1 (OR 0.45; 95% CI: 0.23, 0.91) and step 2 (OR 0.53; 95% CI: 0.29, 0.96) compared to baseline, while there was no significant difference over baseline for steps 3 to 6. For involvement with treatment decisions, apart from the initial improvement in step 1 (OR: 0.39; 95% CI: 0.19, 0.83), there was no significant difference over baseline for all subsequent steps (steps 2 to 6). Time spent with the healthcare provider also followed a similar pattern of worsening satisfaction. Following the initial improvement in step 1 over baseline (OR 0.35; 95% CI: 0.18, 0.66), four out of the five subsequent steps show significantly worse patient ratings with the odds for step 5 (OR 7.02; 95% CI: 3.44, 14.32) and step 6 (OR 6.00; 95% CI: 3.19, 11.16) being the largest.

2.4 Discussion

In this study, we found no statistically significant results that suggest evidence of a causal impact of EAAA on either overall patient perception or on perception of any of the other subdomains of quality measured (see Figure 2-3). This null finding may result from the fact that EAAA did not lead to a very large change in patient volume – less than 10% increase in this study. It may also be due to the change in CD4 thresholds for standard of care from less than 350 cells/μl to less than 500 cells/μl. This may have created a blunting effect of EAAA on patient satisfaction.

Nevertheless, this result is important because our initial hypothesis of direction of change of patient satisfaction due to EAAA was ambiguous. On the one hand, it was plausible that patient satisfaction would improve due to EAAA – because patients in early disease stages are no longer told that they have to wait until they become sicker before they could initiate ART. On the other hand, it was plausible that patient satisfaction would get worse – because EAAA could increase the number of patients and thus lead to more crowding and longer queues and because early patients are more likely to lack the experience of recovery on ART. Our null findings thus have an important policy implication: patient satisfaction changes – and their consequences – should not be a policy concern to delay the introduction of public EAAA policies. The consequences of reducing patient satisfaction emphasize further why this finding is important for different stakeholders. They include humanitarian concerns about the intrinsic value of a publicly delivered good that does not highly satisfy its beneficiaries, programmatic concerns about increasing loss to follow-up; and they include political concerns in countries where HIV treatment is seen as an important service that the government is responsible for delivering.

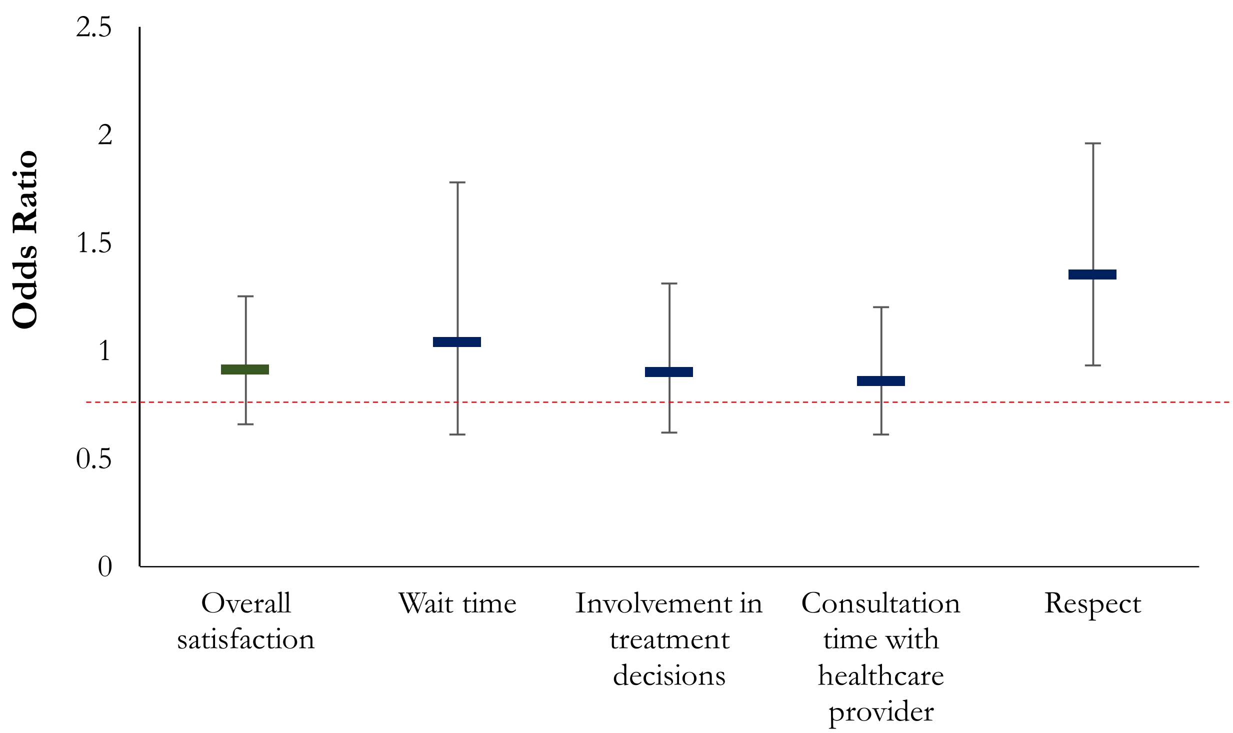

Figure 2-3. Causal impact of Early Access to ART for All (EAAA) on patient satisfaction

There is substantial evidence that dissatisfaction among patients will indeed negatively affect health-relevant behaviors. For example, Chimbindi and colleagues found that HIV positive patients on treatment in rural South Africa were particularly concerned about wait times and being treated respectfully by health workers (1). A different study of patients in Uganda, Tanzania, and Botswana, identified dissatisfaction with long wait times and queues as reasons for poor adherence to HIV treatment (2). Other studies have identified one or more of these subdomains of quality as important determinants of uptake (3), or loss-to-follow-up (4-6).

Our study had several strengths. To best of our knowledge, this is the first empirical study that quantifies the impact of EAAA on patient satisfaction. In addition, our use of a robust study design (i.e. a stepped-wedge cluster RCT) provides reliable evidence to fill existing gaps in current knowledgebase. Lastly, the location of our study in Swaziland, a high HIV prevalence country, increased our chances of seeing the potential volume effects and compositional changes to the treatment population. This would not be the case in low HIV prevalence countries.

Our study also had some limitations. These included, relatively wide confidence intervals – however, all point estimates are close to 1, i.e., to the line of no effect – it is thus unlikely that with increasing sample size and power, our conclusion of no effect would change. In addition, we left out some potentially important patient satisfaction subdomains such as travel time, or availability of medications and tests. These are important subdomains of quality that contribute to patient perception of HIV care. However, within the context of switching from standard of care to EAAA, these domains were not expected to experience significant changes, and any changes that may have occurred would equally affect control and EAAA sites. Furthermore, this study was conducted in a setting of predominantly rural public-sector primary care facilities in Swaziland. Therefore, our findings may not apply to urban settings in sub-Saharan Africa; Urban populations may have different expectations, and may thus be more affected by the changes that EAAA brought about. But our findings could still be generalized to other situations such as the roll-out of EAAA in rural areas of similar low- and middle-income countries. Many of these countries are transitioning towards EAAA and have adopted the UNAIDS 90-90-90 targets. To achieve these targets, each country may experience significant increases in the volume of patients and changes to the composition of the HIV-positive population it cares for. Our findings can also be generalized to other situations where there is a population-level expansion of services e.g. integration of primary-health-care. These expansions have a similar effect on the health system and are particularly important in health systems that have very little buffer-capacity to respond to increases in health system demands.

Finally, our study was designed to test the impact of EAAA on satisfaction but not the mechanism through which the effect occurred. Within the context of null results as seen in this study, the effect of this study design choice might be negligible. However, given additional resources, future studies should consider designs that enable tests of mechanisms of action.

2.5 Conclusion

In summary, this study investigated the causal impact of EAAA on patient perception of quality of care. We found no significant impact of EAAA on overall patient satisfaction. We also found no evidence of a causal impact of EAAA on perception of wait time, involvement in treatment decisions, consultation time, and respect received from the health worker. However, we found some evidence of worsening patient satisfaction scores as the study progressed, but this could not be explained by any other factors investigated. Patient satisfaction concerns should not be an impediment to the wider introduction of EAAA in Swaziland and similar settings in southern Africa.

2.6 Other Trial Information

2.6.1 Registration and funding

This trial is registered with ClinicalTrials.gov number NCT02909218. The study protocol was published the Trials journal volume 18, issue 1 of 2017 (7) and is available online. Funding support for the study was provided by the Embassy of the Kingdom of the Netherlands in South Africa/Mozambique, Médecins Sans Frontières, Mylan, British Columbia Centre of Excellence in Canada, and the Dutch Postcode Lottery in the Netherlands. The funders had no role in study.

2.6.2 Acknowledgements

We would like to appreciate all members of the ministry of Health involved in the trial, staff and members of the Clinton Health Access Initiative in Swaziland, and all respondents who participated in the study.

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3 Chapter Three:

Impact of quality improvement training on patient perception of quality of postnatal care in rural South-Africa – a stepped-wedge cluster randomized controlled trial

Abstract

Background: A mother's perception of the quality of postnatal care influences her decision to continue care for that baby (or future babies), and her likelihood of adhering to treatment instructions, which in turn affect health outcomes for her and the child. Hence, improved satisfaction, a health system goal, is an important policy consideration for maternal, newborn and child health. Against the backdrop of a planned rollout of quality improvement (QI) interventions across PHC clinics in rural South Africa, we implemented a study to assess the impact of a QI intervention on maternal perception of the quality of postnatal care. We hypothesized that QI could influence satisfaction positively or negatively: positively by improving the quality of care, and negatively through unintended effects (e.g. longer wait times arising from improved comprehensiveness of care provided, or reallocation of human resources from one service to another). This study investigated the impact on patient perception of postnatal care, of a QI intervention designed to increase the quality of care across a continuum of maternal, newborn children, and women's health services (MNCWH).

Methods and findings: We use data from a stepped-wedge cluster randomized controlled trial (NCT02626351) in 7 PHC clinics in the Hlabisa sub-district, KwaZulu-Natal, South Africa (n=1,066) to investigate the impact of implementing a quality improvement (QI) intervention for MNCWH on the pre-defined secondary outcome of patient perception of postnatal care. We assessed perception of several dimensions of quality: overall quality of care, wait time, patient-provider communication, consultation time, level of involvement in treatment decisions, and respect received from the health worker. We measured satisfaction on a five-point Likert scale and analyzed the data with a mixed-effects ordinal logistic regression model. The QI intervention did not significantly change patient perception of postnatal care in any dimension. The odds ratios were 1.05 (95% CI: 0.62, 1.77; $p = 0.868$) for perception of overall quality of care, 1.06 (95% CI: 0.62,

1.81; $p = 0.818$) for wait time, 1.10 (95% CI: 0.71, 1.69; $p = 0.669$) for communication, 1.18 (95% CI: 0.51, 2.71; $p = 0.698$) for consultation time with provider, 0.97 (95% CI: 0.55, 1.71; $p = 0.911$) for level of involvement in treatment decisions, and 0.96 (95% CI: 0.59, 1.57; $p = 0.882$) for respect received from the health workers.

Conclusion: A QI intervention in MNCWH services did not significantly affect patient perception of postnatal care. With regards to patients' satisfaction, QI interventions can likely be safely implemented in the primary care clinics where antenatal and postnatal care is provided. Future innovations in QI should include a focus on interventions that improve patient satisfaction.

3.1 Introduction

A mother's perception of the quality of postnatal healthcare she receives is important for a variety of reasons. First, satisfaction has intrinsic value in and of itself, and is often specified or implied as a distinct goal of the health system, at par with health outcomes and financial risk protection (1, 2). In addition, patient satisfaction has instrumental value through its effect on postnatal care utilization rates and adherence to postnatal care treatment regimens such as prevention of mother to child transmission (PMTCT) of HIV. Mothers who are dissatisfied with the quality of care they received during an index pregnancy are less likely to enroll in postnatal care after delivery of that baby or after delivery of future babies. Mothers also share and receive information about their experiences of maternal and child healthcare through informal networks of friends and family (3, 4). In this way, they influence the health seeking behaviors of their friends while also being influenced by others.

In a study of mothers in rural Tanzania, Gourlay and colleagues showed that experienced or anticipated negative staff behavior, poor patient-provider communication, and disrespectful treatment decreased participation in future PMTCT services (5). In other studies, women were less likely to seek future postnatal healthcare if they had experienced poor patient-provider communication, had experienced health worker absence, or experienced lack of supplies and equipment needed for care (6-8). These effects of maternal perception of quality, on decisions to seek postnatal care might partly explain the low rates of postnatal care utilization in sub-Saharan Africa where rates of loss-to-follow-up for postnatal HIV care range between 19% and 90% (9), and less than half of the women who deliver in a health facility return for post-natal care (10). In the KwaZulu-Natal province of South Africa, the location of this study, up to 58% of HIV-positive mother-infant pairs requiring postnatal HIV care are lost-to-follow-up which creates challenges for PMTCT programs (11, 12).

To improve the quality of healthcare delivered, clinical teams frequently adopt a Quality Improvement (QI) approach/model and implement this over sustained periods of time (13-17). Globally, this approach has been shown to be effective in improving the procedural quality of healthcare (15, 18) but there are also instances where they had no significant impact on quality (19). In South Africa, Youngleson and colleagues showed significant improvements in clinical processes (e.g. postnatal HIV testing) and outcomes (e.g. proportion of infants testing negative to HIV) in the postnatal period following the implementation of a QI intervention for prevention of mother to child transmission (PMTCT) of HIV programs between 2006 and 2009 (17). In a separate study, Doherty and colleagues also showed improvement in early infant diagnosis (EID) in the postnatal period from 24% to 68% following the implementation of a QI intervention for PMTCT (20). Building on these and other studies, the Government of South Africa adopted quality improvement as a cross-cutting approach in its Strategic Plan for Maternal, Newborn, Child and Women's Health (MNCWH) and Nutrition in South Africa – 2012 to 2016 (21, 22).

While one would hope that the roll out of QI would have positive impacts on healthcare, there are reasons to be concerned about the potential for negative effects. For example, in resource-poor PHC clinics, QI teams might redirect resources (e.g. healthcare staff) from a less visible service such as postnatal care to one that is more visible such as antenatal care or labor & delivery, causing dissatisfaction among postnatal care patients. In addition, a QI intervention that improves comprehensiveness of the care visit might also cause long queues and longer wait times, as patients require more consultation time during the visit to receive care. Furthermore, the extra workload placed on the health workers could negatively impact health worker morale, patient-provider communication, and respect accorded to patients. These negative effects might be particularly large if the baseline levels of care were very low to begin with, and the changes caused by the QI intervention are large. Patients may also not like the results of the QI intervention being considered, for example, a QI intervention that targets better follow-up for HIV treatment might require more clinic visits and additional viral load tests which patients might consider burdensome. Conversely, a QI intervention that targets improvements in rational drug use will discourage the practice of dispensing antibiotics to children with suspected cases of viral fevers and this might be frustrating to parents who want to see some treatment given to their sick child.

In light of these potential effects of QI on patient satisfaction, and the planned government scale-up of QI interventions across the KwaZulu-Natal province of South Africa (21), our study set out to provide relevant evidence to support to scale-up activities. The study is part of the larger MONARCH trial (NCT02626351), a stepped-wedge cluster randomized control trial in seven PHC clinics to assess the impact of a QI training intervention on several outcomes related to maternal, newborn children and women's health (MNCWH). This paper focuses on the impact of QI training on perception of the quality of postnatal care, a pre-specified secondary outcome of the study. In addition, our study assessed the impact of the training intervention on perception of wait time at postnatal clinics, perception of the quality of patient-provider communication, perception of the level of patient-involvement in treatment decisions, perception of consultation time, and perception of the level of respect received from the health worker.

3.2 Methods

3.2.1 Trial Design

We conducted a stepped-wedge cluster randomized controlled trial in seven primary health care (PHC) facilities in the Hlabisa sub-district of Kwazulu Natal, South Africa. The trial aimed to strengthen the capacity of Hlabisa management and operational staff to coordinate the framework for key MNCWH interventions of Nutrition, Antenatal care, Reproductive health, Child health, and HIV (MONARCH Trial). This paper focuses on the aspect of the MONARCH trial that investigates the causal impact of quality improvement (QI) interventions on patient experience of post-natal care services.

This was a stepped-wedge trial conducted over an eighteen-month period between July 2015 and January 2017 (Figure 3-1). All seven PHC facilities were treated as individual clusters and each started the study in the control phase. Subsequently each PHC clinic was randomized to transition from the control phase to the intervention phase in one of six different steps. To ensure that all PHCs transitioned within the six steps in the study, two PHCs were randomized to transition in a single step, while the other five PHCs were randomized to transition to intervention phase in each of the other five steps. Each step lasted approximately two months. The actual start and end dates of the different steps veered slightly from the precise two-month tact, because this was a real-life health systems implementation study and the QI team needed to schedule intervention with clinics and make adjustments for local holidays.

		Pre-rollout	29 SEP to 11 NOV	24 NOV to 19 JAN	26 JAN to 8 MAR	17 MAR to 11 MAY	18 MAY to 30 JUN	19 JUL to 31 AUG	Post-rollout 01 SEP 2016 to 31 JAN 2017
Group 6	Mpukunyoni							Transition	
Group 5	Gunjaneni						Transition		
Group 4	Mtubatuba					Transition			
Group 3	Machibini				Transition				
Group 3	Esiyembeni				Transition				
Group 2	KwaMsane			Transition					
Group 1	Somkhele		Transition						
No. of months			1.5	2	1.5	2	1.5	1.5	5
Steps		Pre-rollout (Baseline)	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Post-rollout (End-line)

Legend: Control | QI: Transition | QI: Full Implementation

Figure 3-1. MONARCH Stepped-wedge Trial Design

Each step was designed to span two calendar months but accommodations had to be made for holidays and logistics. The actual number of months for each step are shown in the figure above

3.2.2 Sample Size

The sample size for the entire MONARCH study was calculated for the primary endpoint, with a plan to enroll as many patients as possible for the secondary endpoints (including for satisfaction endpoints). A minim sample size required to show a 20% improvement in HIV testing and care (at 80% power, 0.05 confidence-level, and 0.1 intra-cluster correlation coefficient) was 630 per group (i.e. 1260 total). This translated to 90 interviews per PHC facility.

3.2.3 Participants

Study participants included health workers with clinical roles, health workers with operational roles, and patients attending postnatal care clinics. At each PHC clinic health workers recruited included an operational manager, nurses, counsellors, and other clinical staff. These staff received training on the application of the QI intervention approach. All pregnant women age eighteen years and older who visited any of the seven PHCs in the study to access postnatal care services were eligible for inclusion in the study. Data were collected from women attending the PHC facilities on three separate occasions: at delivery, at the three- to five-day post-natal care visit, and at the six-week post-natal care visit. Patient perception of the quality of post-natal care services was only assessed at the six-week postnatal visit.

Ethics approval for the study was given by the University of KwaZulu-Natal Biomedical Research Ethics board (BE209/14). The Harvard team had access to only de-identified data and therefore, this qualified under the Harvard IRB non-human subjects research exemption.

3.2.4 QI Intervention

The quality improvement intervention was implemented at the level of the health facility with the primary aim of equipping teams with the skills and tools to effectively implement QI interventions from start to finish without external help.

All PHCs started the study in the control phase. At the beginning of each step, one or more PHCs were randomized to transition from control to the QI intervention phase. During this transition period, a QI facilitator from the Quality Improvement unit at the Center for Rural Health UKZN was matched to the clinical and operational staff at the PHC. This QI facilitator served as a mentor to the PHC staff, provided training on how to implement QI approaches such as root-cause analysis, priority setting, PDSA cycles, process mapping etc. Once trained, clinical teams utilized these skills to identify maternal and child health problems within the PHC, developed intervention plans to solve identified problems, and monitored the implementation of their plans. Lessons learned from implementation were incorporated into subsequent iterations of the process through organized learning sessions. Teams continued to repeat the QI intervention cycles throughout the study period.

3.2.5 Outcomes

The main outcome of interest for this study was patient perception of the quality of postnatal care. This was a pre-specified secondary outcome of the larger MONARCH study (NCT02626351). We also measured patient perception of five other domains of quality related to postnatal care. These included, perception of wait time, perception of patient-provider communication, perception of consultation-time, perception of level of involvement in treatment decisions, and perception of the level of respect received from the health worker. Figure 3-2 shows a sample of the questions asked for perception of overall quality of postnatal care, as well as for perception of each of the domains of quality assessed.

3.2.6 Randomization and data collection

Randomization was done in collaboration with the uMkhanyakude District Office, the District Hospital Management team, and Hlabisa Hospital. Each PHC clinic included in the study was randomly assigned to enter the study at one of six-steps (periods). All clinics were aware of their eligibility for the study but were blinded to the timing of their assignment or the order of randomization. Each clinic was informed of their assignment two weeks before the start of the QI training intervention. Data from all PHC clinics were collected at baseline and during each study period. Women attending six-weeks postnatal clinics were recruited to participate in the study and asked questions about perception of postnatal care services using a patient exit questionnaire (see Figure 3-2).

Figure 3-2. Sample patient perception of quality questions

Quality Domain	**Questions**	**Options***				
	Please think about your visit to the clinic today beginning from the time you arrived up until now. *Sicela ucabange mayelana nokuvakasha kwakho emtholampilo namhlanje kusukela ngalesisikhathi ufika kuze kube imanje.*	**Very Good** ***Kuhle kakhulu***	**Good** ***Kuhle***	**Moderate** ***Kulingene***	**Bad** ***Kubi***	**Very bad** ***Kubi kakhulu***
		1	**2**	**3**	**4**	**5**
Overall Quality	**3.1** How would you rate your experience with the overall service you received during your postnatal care? *Ungathini ngezinga lesikhathi owasithola emva kokubeletha?*					
Wait time	**3.2** How would you rate the amount of time you waited before being attended to? *Ungafaka kanjani isipiliyoni sesikhathi owasilinda ngaphambi kokuba uthole usizo?*					
Respect	**3.3** How would you rate your experience of being greeted and talked to respectfully? *Ngokupheleleyo ungathini ngezinga lokubingelelwa nokuxoxiswa ngenhlonipho kukaMpume?*					
Communication	**3.4** How would you rate your experience of how clearly the healthcare providers communicated with you? *Ngokupheleleyo, ungathini ngezinga umsebenzi wezempilo axoxisana ngalo nawe?*					
Consultation time	**3.5** How would you rate your experience of how much time you spent with the healthcare provider? *Ngokupheleleyo ungathini ngezinga nesikhathi osichithe nomsebenzi wezempilo?*					
Involvement in treatment decisions	**3.6** How would you rate your experience of getting involved as much as you wanted to be, in decisions about your care or treatment? *Ngokupheleleyo, ungathini nezinga lokuzimbandakanya ngendlela obufisa ngayo, ekwenzeni izinqumo mayelana nokunakekelwa noma ukwelashwa?*					

* Original options ranged from 1 (very bad) to 5 (very bad). Order of options rearranged to match analysis in current paper.

3.2.7 Statistical methods

We conducted our analysis based on the intent-to-treat principle with PHC clinics assigned to intervention and control periods based on the randomization process described above and women assigned to PHC clinics based on the first PHC clinic visited post-partum. We used mixed-effects ordered logistic models which require the assumption of proportional odds (23). We performed six different sets of regressions: one with overall satisfaction as the outcome and five others with the other domains of postnatal care quality as an outcome. For each domain of quality, we regressed perception of quality in that domain on exposure to QI intervention, and included fixed effects for study-step, and random effects for cluster (i.e. PHC clinic). Our regressions followed the approach described by Hussey and Hughes (24) for analyzing data from stepped-wedged randomized controlled, and the details of the statistical models can be found in section 3.7.1.

To test the robustness of the results for perception of overall quality of care, we fit a base model and an extended model that controlled for educational status, employment status, and attendance of early (3-6 day) post-natal clinics. These factors were included as there is ample evidence that mother's perception of quality and behavioral intent are influenced by a wide variety of factors including those listed above (25-29).

3.3 Results

3.3.1 Participants recruited and numbers analyzed

A total of 1,066 mothers attending the six-week postnatal clinics were enrolled in our study between July 2015 and December 2016. Figure 3-3 shows a grid containing the number of patients enrolled and number who were HIV positive at enrollment. Recruitment for each period ranged from 107 in the lowest recruitment period to 184 in the highest recruitment period, while total recruitment by PHC clinic ranged from 35 in the smallest clinic (Esiyembeni) to 278 in the largest clinic (KwaMsane). All patients were interviewed using the patient experience questionnaires, which contained questions about individual patient experiences of the quality of healthcare received at the postnatal clinic on the day of the survey.

		Enrollment by PHC clinic and study period N (number HIV positive)								
	PHC Clinic	Pre-rollout	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Post-rollout	Clinic Total
Group 6	Mpukunyoni	29 (8)	20 (7)	14 (9)	18 (10)	15 (6)	13 (8)	21 (4)	21 (8)	151 (60)
Group 5	Gunjaneni	19 (7)	20 (7)	5 (2)	13 (5)	18 (7)	4 (0)	9 (3)	13 (3)	101 (34)
Group 4	Mtubatuba	50 (22)	45 (18)	30 (10)	30 (13)	22 (13)	17 (9)	23 (10)	24 (11)	241 (106)
Group 3	Machibini	15 (2)	17 (7)	13 (1)	14 (6)	7 (3)	13 (3)	12 (4)	11 (1)	102 (27)
Group 3	Esiyembeni	6 (1)	3 (1)	3 (3)	6 (0)	4 (1)	2 (1)	4 (1)	7 (2)	35 (10)
Group 2	KwaMsane	40 (25)	32 (16)	34 (17)	29 (14)	32 (17)	37 (28)	25 (13)	49 (28)	278 (158)
Group 1	Somkhele	25 (8)	17 (6)	14 (6)	15 (7)	16 (8)	21 (8)	20 (6)	30 (16)	158 (65)
Period Total		184 (73)	154 (62)	113 (48)	125 (55)	114 (55)	107 (57)	114 (41)	155 (69)	1066 (460)

Legend: Control | QI: Transition | QI: Full Implementation

Figure 3-3. Total number of patients enrolled and number of patients who were HIV positive at enrollment, by PHC clinic and study period

The numbers in the figure represent total number of participants interviewed per step in each group of PHC clinics. Numbers in parenthesis represent the number of participants who were HIV positive

3.3.2 Patient characteristics

Table 3-1 shows a comparison of patient characteristics at baseline, and by intervention and control groups. The average age of the entire study population was 26 years (SD 6) while the mean age for intervention and control groups were 26 (SD 6) and 26 (SD 6) respectively. 45% of all participants were HIV positive at enrollment while the percent of HIV positive for intervention and control groups were 46% and 43% respectively. 8% of the overall population was married with no significant difference between intervention (8%) and control (8%) groups. 14% of the study population was employed, while the percentage employed in intervention and control groups was 15% and 11% respectively. The average family income was the equivalent of 3.6 USD (SD 2.9 USD) for the overall study population, 3.3 USD (SD 2.7 USD) for the intervention group, and 4 USD (SD 3.1 USD) for the controls. There were no significant differences in education status.

Table 3-1. Comparison of patient characteristics at baseline and by intervention and control periods

Characteristic	Control (N = 493)	Intervention (N = 573)	Overall (1,066)
Age (Mean, SD)	26.4 (6.2)	26.3 (5.8)	26.3 (5.9)
Demographics, n (%)			
Married	40 (8.2)	42 (7.5)	82 (7.8)
Education			
No education	10 (2.1)	6 (1.1)	16 (1.6)
Primary education	20 (4.2)	35 (6.4)	55 (5.4)
Secondary education	406 (85.3)	441 (81.1)	847 (83.0)
Post-secondary education	40 (8.4)	62 (11.4)	102 (10.0)
Employed	55 (11.3)	84 (14.9)	139 (13.9)
Family income, mean (sd)	3.95 (3.05)	3.33 (2.69)	3.61 (2.88)
HIV positive	203 (42.6)	257 (46.1)	460 (44.5)
Attended early (3-6 day) post-natal clinic	388 (79.2)	479 (85.1)	867 (82.3)
Patient Satisfaction Scores, mean (SD)			
Overall patient satisfaction: 1 = very good, 5 = very bad	2.3 (0.9)	2.07 (0.7)	2.2 (0.8)
Patient Satisfaction Sub-Domains: 1 = very good, 5 = very bad			
Wait time	2.5 (0.9)	2.6 (0.9)	2.6 (0.9)
Communication with healthcare provider	2.1 (0.6)	2.0 (0.5)	2.1 (0.6)
Involvement in treatment decisions	2.5 (0.8)	2.1 (0.6)	2.3 (0.7)
Consultation time spent with healthcare provider	2.4 (0.7)	2.2 (0.6)	2.3 (0.7)
Respectful treatment by health workers	2.2 (0.7)	2.0 (0.6)	2.1 (0.6)

3.3.3 Outcomes and estimation

Results from our analysis show no impact of QI on patient perception of overall quality of healthcare received at postnatal clinics (Table 3-2), and no impact of QI on patient perception of any of the other five domains of post-natal healthcare quality investigated (Table 3-3). It is important to note that the odds ratios reported are odd ratios that compare the odds of reporting worse patient experiences to the odds of reporting better patient experiences.

In the basic model that assumed a uniform effect of QI across all PHC clinics, the odds ratios of reporting worse perception of quality with QI intervention compared to control was not significant for all domains of quality: Overall patient satisfaction (OR 1.05; 95% CI: 0.62, 1.77; $p = 0.868$), wait time (OR 1.06; 95% CI: 0.62, 1.81; $p = 0.818$), communication (OR 1.10; 95% CI: 0.71, 1.69; $p = 0.669$), consultation time with provider (OR 1.18; 95% CI: 0.51, 2.71), involvement in treatment decisions (OR 0.97; 95% CI: 0.55, 1.71; 0.911), and respect (OR 0.96; 95% CI: 0.59, 1.57; $p = 0.882$). As can be seen in Figure 3, although the odds ratios for all satisfaction domains differ from one, their 95% confidence intervals all overlap one making the effect of QI on patient satisfaction non-significant.

Table 3-2. Effect of Quality Improvement (QI) interventions on patient perception of overall quality of postnatal healthcare

	Model 1* Odds Ratio 95% CI p-value	Model 2* Odds Ratio 95% CI p-value	Model 3* Odds Ratio 95% CI p-value	Model 4* Odds Ratio 95% CI p-value
Quality Improvement Intervention	1.05 0.61 to 1.81 0.868	1.05 0.62 to 1.77 0.863	1.07 0.64 to 1.79 0.792	1.06 0.64 to 1.76 0.818
Steps (ref: Baseline)				
Step 1	0.62 0.33 to 1.15 0.129	0.57 0.29 to 1.77 0.863	0.57 0.30 to 1.10 0.096	0.52 0.26 to 1.02 0.056
Step 2	0.61 0.28 to 1.35 0.224	0.57 0.24 to 1.31 0.186	0.56 0.25 to 1.27 0.166	0.52 0.22 to 1.22 0.134
Step 3	0.74 0.20 to 2.72 0.648	0.66 0.17 to 2.51 0.541	0.60 0.19 to 1.90 0.383	0.53 0.16 to 1.77 0.305
Step 4	0.60 0.10 to 3.46 0.567	0.58 0.10 to 3.46 0.547	0.52 0.11 to 2.39 0.400	0.49 0.10 to 2.37 0.378
Step 5	0.34 0.14 to 0.81 0.015	0.35 0.14 to 0.85 0.021	0.30 0.13 to 0.68 0.004	0.30 0.12 to 0.71 0.007
Step 6	0.42 0.17 to 1.00 0.051	0.39 0.17 to 0.93 0.034	0.38 0.17 to 0.87 0.021	0.35 0.16 to 0.78 0.010
End-line	0.26 0.09 to 0.74 0.012	0.26 0.09 to 0.78 0.016	0.22 0.08 to 0.58 0.003	0.21 0.07 to 0.60 0.004
HIV Positive		0.90 0.72 to 1.13 0.366		0.88 0.69 to 1.13 0.312

* Models 1 and 2 assume a homogenous underlying time trend across all PHC clinics while models 3 and 4 assume each PHC clinic has a different underlying time trend.

Table 3-2 (Continued). Effect of Quality Improvement (QI) interventions on patient perception of overall quality of postnatal healthcare

	Model 1*	Model 2*	Model 3*	Model 4*
	Odds Ratio 95% CI p-value	**Odds Ratio 95% CI p-value**	**Odds Ratio 95% CI p-value**	**Odds Ratio 95% CI p-value**
Education (ref: no education)				
Primary education		0.96 0.30 to 3.08 0.943		0.82 0.25 to 2.70 0.743
Secondary education		1.00 0.34 to 2.92 0.997		0.87 0.27 to 2.75 0.806
Post-secondary education		1.26 0.34 to 4.66 0.730		1.16 0.30 to 4.57 0.827
Employed		0.91 0.65 to 1.27 0.575		0.90 0.64 to 1.26 0.536
Attended early (3-6 day) post-natal clinic		0.87 0.73 to 1.04 0.122		0.89 0.74 to 1.06 0.193
/cut1	-2.53 -3.08 to -1.97	-2.69 -4.13 to -1.26	-2.68 -3.21 to -2.14	-3.00 -4.45 to -1.55
/cut2	0.77 0.35 to 1.19	0.58 -0.83 to 2.00	0.71 0.33 to 1.10	0.38 -1.05 to 1.81
/cut3	1.96 1.68 to 2.24	1.74 0.44 to 3.04	1.95 1.64 to 2.27	1.58 0.19 to 2.98
/cut4	3.60 3.21 to 3.99	3.46 2.18 to 4.74	3.62 3.25 to 4.00	3.33 1.98 to 4.68
Variance (Clusters)	0.04 0.01 to 0.19	0.05 0.02 to 0.17	0.03 0.01 to 0.11	0.04 0.01 to 0.11
Variance (Cluster-Periods)	-	-	0.19 0.04 to 0.86	0.20 0.04 to 0.89
Number of Observations	1,056	982	1,056	982

* Models 1 and 2 assume a homogenous underlying time trend across all PHC clinics while models 3 and 4 assume each PHC clinic has a different underlying time trend.

Despite the lack of evidence on QI impact on patient satisfaction, our results revealed a time trend for perception of quality of communication, involvement in treatment decisions, and consultation time, but not for wait time or respect received from the health worker. For perception of quality of communication, the odds ratio for each period (compared to baseline) ranged from 0.23 (95% CI: 0.09, 0.61; $p = 0.003$) in period 1 to 0.20 (95% CI: 0.08, 0.46; <0.001) at end-line. For perception of quality of involvement in treatment decisions, the odds ratio for each period (compared to baseline) ranged from 0.20 (95% CI: 0.09, 0.44; $p = <0.001$) in period 1 to 0.11 (95% CI: 0.04, 0.33; $p = <0.001$) at end-line. For perception of quality of consultation time, the odds ratio for each period (compared to baseline) ranged from 0.36 (95% CI: 0.15, 0.84; $p = <0.001$) in period 1 to 0.16 (95% CI: 0.07, 0.38) at end-line. Perception of overall quality of care showed a general trend of improving satisfaction in subsequent periods (compared to baseline), but this only became significant (or marginally significant) in period 5 (OR 0.34; 95% CI: 0.14, 0.81; $p = 0.015$), period 6 (OR 0.42; 95% CI: 0.17, 1.00; $p = 0.051$), and end-line (OR 0.26; 95% CI: 0.09, 0.74; $p = 0.012$).

We conducted further analysis assuming heterogeneous time trends across all PHC clinics and our findings remained essentially unchanged. Details can be found in Table 3-3 and 3-4.

Table 3-3. Effect of Quality Improvement (QI) interventions on patient perception of various domains of postnatal healthcare quality

	Overall Quality	**Wait Time**	**Commu-nication**	**Treatment Decisions**	**Consultat-ion Time**	**Respect**
	Odds Ratio 95% CI p-value	**Odds Ratio 95% CI p-value**	**Odds Ratio 95% CI p-value**	**Odds Ratio 95% CI p-value**	**Odds Ratio 95% CI p-value**	**Odds Ratio 95% CI p-value**
Quality Improvement Intervention	1.05 0.61 to 1.81 0.868	1.06 0.62 to 1.81 0.818	1.10 0.71 to 1.69 0.669	0.97 0.55 to 1.71 0.911	1.18 0.51 to 2.71 0.698	0.96 0.59 to 1.57 0.882
Steps (ref: Baseline)						
Step 1	0.62 0.33 to 1.15 0.129	0.88 0.56 to 1.37 0.569	0.23 0.09 to 0.61 0.003	0.20 0.09 to 0.44 <0.001	0.36 0.15 to 0.84 0.019	0.47 0.21 to 1.05 0.066
Step 2	0.61 0.28 to 1.35 0.224	0.77 0.48 to 1.25 0.296	0.32 0.17 to 0.63 0.001	0.13 0.06 to 0.26 <0.001	0.23 0.09 to 0.57 0.001	0.54 0.22 to 1.33 0.184
Step 3	0.74 0.20 to 2.72 0.648	1.24 0.87 to 1.78 0.237	0.33 0.17 to 0.64 0.001	0.25 0.12 to 0.52 <0.001	0.30 0.15 to 0.58 <0.001	0.58 0.23 to 1.45 0.241
Step 4	0.60 0.10 to 3.46 0.567	1.11 0.57 to 2.20 0.753	0.25 0.08 to 0.79 0.018	0.18 0.07 to 0.40 <0.001	0.22 0.07 to 0.65 0.007	0.66 0.21 to 2.07 0.475
Step 5	0.34 0.14 to 0.81 0.015	1.42 0.65 to 3.10 0.380	0.33 0.13 to 0.87 0.025	0.13 0.05 to 0.31 <0.001	0.25 0.13 to 0.49 <0.001	0.47 0.17 to 1.33 0.156
Step 6	0.42 0.17 to 1.00 0.051	0.81 0.32 to 2.05 0.649	0.24 0.08 to 0.73	0.16 0.04 to 0.53 0.003	0.15 0.08 to 0.28 <0.001	0.42 0.13 to 1.38 0.153
End-line	0.26 0.09 to 0.74 0.012	0.84 0.29 to 2.48 0.748	0.20 0.08 to 0.46 <0.001	0.11 0.04 to 0.33 <0.001	0.16 0.07 to 0.38 <0.001	0.30 0.13 to 0.73 0.008

Table 3-3 (Continued). Effect of Quality Improvement (QI) interventions on patient perception of various domains of postnatal healthcare quality

	Overall Quality	Wait Time	Commu-nication	Treatment Decisions	Consultat-ion Time	Respect
	Odds Ratio 95% CI p-value	**Odds Ratio 95% CI p-value**	**Odds Ratio 95% CI p-value**	**Odds Ratio 95% CI p-value**	**Odds Ratio 95% CI p-value**	**Odds Ratio 95% CI p-value**
/cut1	-2.53 -3.08 to -1.97	-2.84 -3.17 to -2.51	-3.41 -4.27 to -2.56	-4.61 -5.35 to -3.86	-4.18 -4.79 to -3.58	-2.83 -3.50 to -2.17
/cut2	0.77 0.35 to 1.19	0.43 0.27 to 0.59	0.82 0.01 to 1.62	-0.41 -0.86 to 0.05	-0.003 -0.69 to 0.68	1.11 0.53 to 1.70
/cut3	1.96 1.68 to 2.24	1.45 1.19 to 1.72	2.72 2.18 to 3.26	1.49 1.14 to 1.83	1.67 1.03 to 2.31	2.92 2.42 to 3.42
/cut4	3.60 3.21 to 3.99	3.30 2.62 to 3.98	4.43 3.25 to 5.62	3.15 2.88 to 3.42	3.85 3.22 to 4.48	4.08 3.09 to 5.06
Variance (Clusters)	0.04 0.01 to 0.19	0.01 3.21E-04 to 2.98E-01	0.01 1.24E-03 to 1.14E-01	0.07 0.04 to 0.11	0.09 0.04 to 0.19	1.41E-32 8.62E-34 to 2.31E-31
Number of Observations	1,056	1,058	1,053	1,050	1,031	1,058

Table 3-4. Effect of Quality Improvement (QI) interventions on patient perception of various domains of postnatal healthcare quality (Heterogeneous time trends across PHCs)

	Overall Quality	Wait Time	Communi cation	Treatment Decisions	Consulta-tion Time	Respect
	Odds Ratio 95% CI p-value	Odds Ratio 95% CI p-value	Odds Ratio 95% CI p-value	Odds Ratio 95% CI p-value	Odds Ratio 95% CI p-value	Odds Ratio 95% CI p-value
Quality Improvement Intervention	1.07 0.64 to .79 0.792	1.08 0.63 to 1.85 0.769	1.10 0.73 to 1.64 0.654	0.99 0.59 to 1.67 0.979	1.18 0.53 to 2.65 0.687	0.95 0.56 to 1.62 0.859
Steps (ref: Baseline)						
Step 1	0.57 0.30 to 1.10 0.096	0.87 0.52 to 1.46 0.601	0.22 0.08 to 0.63 0.004	0.17 0.07 to 0.39 <0.001	0.30 0.13 to 0.71 0.006	0.46 0.20 to 1.05 0.066
Step 2	0.56 0.25 to 1.27 0.166	0.79 0.47 to 1.31 0.357	0.32 0.16 to 0.63 0.001	0.11 0.05 to 0.24 <0.001	0.19 0.07 to 0.53 0.001	0.54 0.22 to 1.34 0.186
Step 3	0.60 0.19 to 1.90 0.383	1.24 0.84 to 1.84 0.279	0.33 0.17 to 0.65 0.001	0.22 0.09 to 0.50 <0.001	0.28 0.13 to 0.59 0.001	0.58 0.22 to 1.48 0.250
Step 4	0.52 0.11 to 2.39 0.400	1.12 0.55 to 2.29 0.752	0.23 0.07 to 0.80 0.020	0.17 0.08 to 0.36 <0.001	0.21 0.06 to 0.69 0.010	0.66 0.20 to 2.12 0.484
Step 5	0.30 0.13 to 0.68 0.004	1.44 0.61 to 3.41 0.405	0.34 0.12 to 0.93 0.036	0.11 0.04 to 0.30 <0.001	0.22 0.11 to 0.46 <0.001	0.48 0.16 to 1.47 0.200
Step 6	0.38 0.17 to 0.87 0.021	0.82 0.30 to 2.23 0.702	0.23 0.07 to 0.74 0.014	0.13 0.04 to 0.44 0.001	0.14 0.07 to 0.27 <0.001	0.42 0.13 to 1.42 0.164
End-line	0.22 0.08 to 0.58 0.003	0.80 0.26 to 2.41 0.690	0.18 0.07 to 0.45 <0.001	0.09 0.03 to 0.26 <0.001	0.13 0.05 to 0.37 <0.001	0.30 0.12 to 0.72 0.007

All models assume heterogeneous time trends across PHC clinics

Table 3-4 (Continued). Effect of Quality Improvement (QI) interventions on patient perception of various domains of postnatal healthcare quality

	Overall Quality	Wait Time	Communication	Treatment Decisions	Consultation Time	Respect
	Odds Ratio 95% CI p-value	**Odds Ratio 95% CI p-value**	**Odds Ratio 95% CI p-value**	**Odds Ratio 95% CI p-value**	**Odds Ratio 95% CI p-value**	**Odds Ratio 95% CI p-value**
/cut1	-2.68 -3.21 to -2.14	-2.85 -3.22 to -2.49	-3.48 -4.41 to -2.56	-4.80 -5.61 to -4.00	-4.33 -5.00 to -3.67	-2.86 -3.53 to -2.19
/cut2	0.71 0.33 to 1.10	0.45 0.27 to 0.63	0.82 0.02 to 1.61	-0.45 -0.90 to 0.00	-0.08 -0.79 to 0.63	1.11 0.51 to 1.73
/cut3	1.95 1.64 to 2.27	1.49 1.21 to 1.76	2.75 2.23 to 3.28	1.47 1.13 to 1.82	1.65 1.02 to 2.27	2.93 2.38 to 3.49
/cut4	3.62 3.25 to 4.00	3.33 2.67 to 4.01	4.47 3.36 to 5.59	3.14 2.85 to 3.43	3.86 3.24 to 4.47	4.09 3.06 to 5.11
Variance (Clusters)	0.03 0.01 to 0.11	1.4E-03 1.48E-15 to 1.40E+09	9.57E-36 1.54E-38 to 5.96E-33	0.05 0.02 to 0.17	0.08 0.02 to 0.23	5.41E-33 1.06E-34 to 2.76E-31
Variance (Cluster-Period)	0.19 0.04 to 0.86	0.07 0.01 to 0.83	0.12 0.02 to 0.72	0.21 0.08 to 0.50	0.16 0.10 to 0.26	0.04 3.64E-04 to 4.09
Number of Observations	1,056	1,058	1,053	1,050	1,031	1,058

All models assume heterogeneous time trends across PHC clinics

3.4 Discussion

Our study makes two important contributions to the literature. First, we found no evidence to suggest that implementation of QI interventions has an effect on patient perception of overall quality of postnatal healthcare or perception of sub-domains of postnatal healthcare quality (Figure 3-4), such as wait time, patient-provider communication, level of involvement in treatment decisions, consultation time, and respect. As such, our results suggest that it is safe – with regards to patient satisfaction – to use QI in this type of primary care setting to improve quality of care. The fact that the QI intervention in MNCWH did not reduce perception of quality postnatal care is particularly important, because levels of postnatal care attendance remain far below country targets. Any change that could further reduce postnatal care attendance would thus be highly problematic and further threaten a health system's ability to reduce maternal and infant mortality and morbidity.

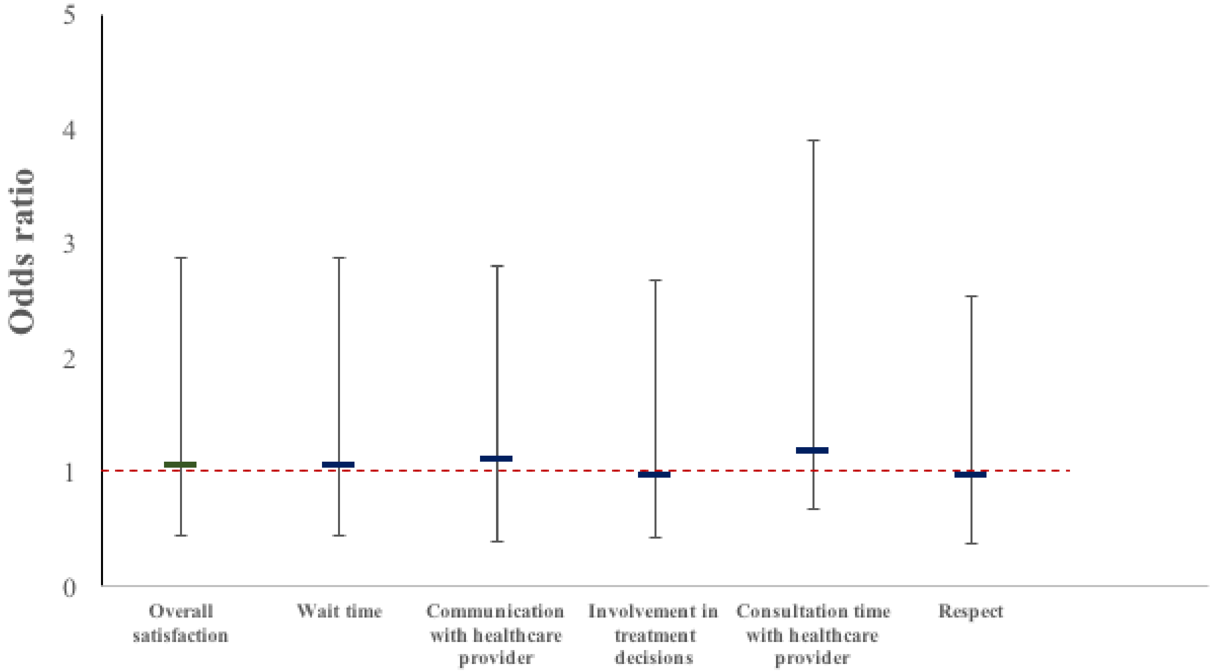

Figure 3-4. Causal impact of Quality Improvement (QI) intervention on patient perception of various domains of postnatal healthcare quality

While our findings indicate that QI is 'safe' with regards to perception of quality of postnatal care, they raise the important question of how much focus should and could be given to subjective dimensions of quality of care (e.g. patient satisfaction) in the study of QI interventions. Although some studies measure the impact on patient satisfaction following introduction of a specific QI initiative to improve quality, few specifically test the impact of QI as an approach in itself on patient satisfaction. Nonetheless, there is a growing trend of including subjective measures of quality as components of QI intervention studies. This is in-part, due to the growing influence of the patient-centered healthcare movement who argue that a patient's perception of the quality of healthcare received has intrinsic value in and of itself (1, 2). Several studies also show that perception of quality of care has instrumental value through its effect on health seeking behaviors such as retention and adherence (3-6). There is therefore good reason to more frequently include patient satisfaction and other subjective measures of quality as outcome measures in QI interventions.

The second major contribution of our study is the strong time trends of improving patient satisfaction observed over the life of the study. The strong time trends during the QI rollout in this stepped-wedge trial suggest that there could be effects related to the QI initiative or the trial that are independent from any direct effect of the core QI activities. Although the study team took extra steps to prevent contamination by limiting interaction between control and intervention staff, there were other potential communication channels outside the control of the study team that may have been sources of contamination. These included 1) routine meetings of facility information officers to discuss PHC clinic data, 2) routine meetings of PHC clinic operational managers with the department of health, 3) other ad-hoc administrative meetings that required PHC clinic staff to interact at their referral hospital. Hawthorne effects (7) are another potential explanation for the strong time trends. In order to capture our outcomes (including patient satisfaction), patients were assessed within the PHC clinic environment and this altered the natural context of healthcare delivery from the start of the trial. It is therefore possible that nurses and other health workers feeling the subtle pressure of being "observed" would be motivated to improve the quality of care she offers leading to better patient satisfaction.

In addition, the presence of time trends in patient perception of some domains of quality while absent in others reinforces the notion that overall patient perception of quality of care is a complex measure which is best complemented by measuring other domains of interest (8-10). While there were significant improvements in patient satisfaction (compared to baseline) in three of five domains of quality throughout the study periods, there was no significant difference in perception of overall quality of care in the early periods compared to the baseline. These differences in time trends suggest that in assessing their levels of satisfaction with postnatal care, patients assign different weights to the different sub-domains of quality. In this study, the pattern suggests that the three domains with improving satisfaction (i.e. patient-provider communication, level of involvement in treatment decisions, and consultation time) may not be significant influencers of overall satisfaction as we see significant improvements in all three in the early periods but no corresponding improvement in overall patient satisfaction.

To test the robustness of our findings, we relaxed the assumption of a uniform underlying trend across all PHC clinics. We fit new regression models that assume a different random effect for each PHC clinic at each time point (study-step) thus adjusting for time-varying characteristics in each PHC (11). Yet our results remained essentially unchanged – models 3 and 4 in Table 3-2 show detailed results for overall satisfaction while Table 3-4 show results for all the other five domains of quality investigated.

Our study has several strengths. To our knowledge, this is the first study to assess the impact of QI on patient perception of postnatal care and therefore provides useful information that would be helpful as the global push towards improving quality of healthcare in resource limited countries gathers steam. We know that maternal satisfaction plays a significant role in determining uptake and adherence to postnatal healthcare (3-5), and we know that QI interventions can improve quality of healthcare (12, 13), but we do not know how QI interventions in the MNCWH service continuum affects maternal perception of quality. Our study fills that gap. A second strength of this study is that it addresses QI interventions within the context of all postnatal care service provision. As a result, it encompasses both HIV-related and non-HIV-related components of postnatal care making it relevant for more primary health care situations. Finally, unlike other studies that investigate the impact of a specific QI intervention with pre-specified improvement goals, our study investigates the impact of training teams in the application of the QI model and leaving them to decide on their improvement goals. This is a more likely scenario in non-specialized healthcare settings common in resource-limited regions (e.g. PHC clinics) that require staff to provide a variety of services while adapting to the changing needs of the population.

Our study also had some limitations. First, since we focused on facility-based postnatal care services, our findings may not be generalizable to other models of postnatal care delivery recommended by WHO such as community-based and hybrid models (14). However, our findings are still relevant as facility-based postnatal care remains the predominant form of postnatal care in South Africa and other low- and middle-income countries (15, 16). A second limitation is the potential for selection bias arising from the fact that perception of postnatal care service was evaluated at the six-week postnatal care clinic, which is the last required clinic visit for regular care. There is evidence from earlier studies that mothers who attend postnatal care clinics and/or continue with postnatal HIV care and treatment until completion are different from mothers who do not on a wide variety of demographic, socioeconomic, and health status factors (17-21). Arguably, women who had reason to dropout due to dissatisfaction would be excluded from our sample, resulting in better satisfaction scores (on average) for our sample. This might leave little opportunity to measure improvements in satisfaction resulting from the QI, but in the same vein, it creates an opportunity to assess reductions in the levels of satisfaction, which we are more concerned about. A third limitation of this study is that it does not account for objective improvements in quality of care so it is not possible to know whether our null findings were a result of a lack of change in quality of postnatal healthcare, or in spite of any changes to quality of postnatal healthcare. Nonetheless, findings from this study are still relevant because our larger question concerns the impact of maternal perceptions (in this case, satisfaction) on healthcare utilization.

From a policy perspective, this study provides evidence to support the planned rollout of QI interventions in the KwaZulu-Natal province of South Africa. Our findings are relevant for potential QI interventions in PHC clinics in other parts of rural South Africa and resource-limited regions in low- and middle-income countries. PHC clinics in the study are similar to other clinics in resource-poor locations, cater to similar populations, and suffer from the same lack of resources compared to larger health facilities. Clinic staff receive less training and supervision than in larger hospitals but are required to play the important gatekeeping role for most MNCWH services. It is within service delivery contexts like these that most women receive MNCWH care and the results of this study are particularly relevant.

In conclusion, we found no evidence of a causal impact of implementing a QI intervention on patient perception of overall quality of postnatal care or patient perception of five subdomains of quality: wait time, patient-provider communication, consultation time, level of involvement in treatment decisions, and level of respect received from the health worker. Despite our null findings, we observed significant time trends of improving patient satisfaction in three out of five domains of quality (i.e. patient-provider communication, level of involvement in treatment decisions, and consultation time) but not in two (i.e. wait time, respect from health workers). We also observed a time trend for perception of overall quality, which was not significant in the early periods but became significant in the last three periods of the study.

3.5 Other Trial Information

3.5.1 Trial registration and funding

This trial is registered with ClinicalTrials.gov (NCT02626351). Funding for the MONARCH trial was provided through the generous support of European Union – South Africa Office. Osondu Ogbuoji was supported by grants from the Harvard T. H. Chan School of Public Health and the Horovitz Foundation.

3.5.2 Acknowledgements

We appreciate the support of all members of the MONARCH trial team, the Department of Health at Hlabisa, and all respondents who participated in the study.

3.6 Additional Information

3.6.1 Statistical models

We conducted our analysis based on the intent-to-treat principle with PHC clinics assigned to intervention and control periods based on the randomization process described above and women assigned to PHC clinics based on the first PHC clinic visited post-partum. We assumed proportional odds (22) and fit mixed-effects ordered logistic models with individuals at the first level and the PHC clinic (cluster) at the second level.

In the main model (see equation 3-1), we explored the causal impact of QI on patient perception of overall quality of postnatal care as well as on patient satisfaction in five domains of quality, including wait time, communication, involvement in treatment decisions, consultation time with healthcare provider, and respect. This model closely mirrors the recommended approach for analysis of stepped-wedged trials with cross-sectional data and assumes a uniform treatment effect across all periods (23).

Equation 3-1

$$Log\left(\frac{\Pr\left(y_{ijt} > m \mid X_{ijt}\right)}{\Pr\left(y_{ijt} \leq m \mid X_{ijt}\right)}\right) = \tau_m - \theta QI_j + \delta_t + \beta X + u_j + \varepsilon_{ijt}\,, \tag{1}$$

where i indexes the individual, j indexes the cluster, and t indexes the step (time). m is a category with $(1 \leq m \leq 5)$, τ is the cut point for that category, θ is the treatment effect, θ_j is an PHC specific treatment effect, QI is a binary variable which takes the value 0 if the PHC clinic is in the control phase and 1 if the PHC clinic is in the QI intervention phase. C_j is a vector of binary variables that takes the value 1 if in cluster *j* and 0 otherwise. X is a vector of independent variables,

β is a vector of logit coefficients, and δ represents the time-steps. $u_j \sim N(0, \sigma_u^2)$ represents cluster-level random effects, and $\varepsilon_{ijt} \sim N(0, \sigma_\varepsilon^2)$ represents individual error terms.

For robustness checks, we fit a second model (see equation 3-2). In this model, we extend equation 1 by relaxing the assumption of a uniform underlying secular trend for all clusters. This model assumes a different random effect for each PHC at each time point (study-step) thus adjusting for time-varying characteristics in each PHC (11).

Equation 3-2

$$Log\left(\frac{\Pr(y_{ijt} > m \mid X_{ijt})}{\Pr(y_{ijt} \leq m \mid X_{ijt})}\right) = \tau_m - \theta QI_j + \theta_j QI_j C_j + \delta_t + \beta X + u_j + v_{jt} + \varepsilon_{ijt} ,$$

where i indexes the individual, j indexes the cluster, and t indexes the step (time). m is a category with $(1 \leq m \leq 5)$, τ is the cut point for that category, θ is the treatment effect, θ_j is an PHC specific treatment effect, QI is a binary variable which takes the value 0 if the PHC clinic is in the control phase and 1 if the PHC clinic is in the QI intervention phase. C_j is a vector of binary variables that takes the value 1 if in cluster *j* and 0 otherwise. X is a vector of independent variables, β is a vector of logit coefficients, and δ represents the time-steps. $u_j \sim N(0, \sigma_u^2)$ represents cluster-level random effects, $v_j \sim N(0, \sigma_v^2)$ represents a random interaction between time and cluster and is independent to u_j, and $\varepsilon_{ijt} \sim N(0, \sigma_\varepsilon^2)$ represents individual error terms.

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4 Chapter Four:

Bypassing health facilities for antenatal and sick-child care: do expectations of quality matter?

Abstract

Background: The perceptions patients have about the quality of healthcare they expect to receive at a particular healthcare facility influences their decision to seek care there or elsewhere. To form these perceptions of quality, patients often consider, certain observable characteristics of the health system, recall previous personal experiences, or rely on information gained from other sources such as friends and family. Several studies have tried to identify which factors patient weight more in making these health facility choices and yielded mixed results. Moreover, most of these studies were limited in their geographic scope or in the number of health services assessed so it is not clear that their findings are generalizable to most environments. This study takes advantage of Service Provision Assessment data from nine low and middle income countries to quantify how well different measures of perceived quality predict a patient's decision to bypass one facility for another when seeking healthcare.

Methods and Findings: We conducted multilevel analyses of SPA data to test the association between bypassing and different measures of perceived quality of care for antenatal care (ANC) and integrated management of childhood illnesses (IMCI). We defined a bypasser as a patient or caregiver who answered no to the question "is this the closest health facility to your home?". We created a health facility technical quality index from patient-provider observations, and an index of structural quality based on WHO's General Service Readiness Index (GSRI) to measure perceived quality. We then regressed bypassing on the different measures perceived quality while controlling for other individual- and facility-level factors. The results from this study showed that for both ANC and IMCI, health facility GSRI was significantly associated with bypassing but health facility technical quality was not. The results also showed that certain health facility characteristics such as hospital (vs. non-hospitals) or privately-owned (vs. government-owned) were significantly associated with bypassing.

Conclusion: These findings suggest that patient expectations of quality may be largely driven by visible factors such as facility characteristics and less by technical factors such as content of care provided. It also suggests patients may adopt proxy measures of quality in making decisions on where to seek care. These proxies may include health facility labels such as "hospital", "government-owned", or "privately-owned", and serve as an important signal of expected quality at a particular health facility.

4.1 Introduction

At the core of most global health targets is the desire to improve health outcomes by increasing utilization of evidence-based, life-saving, or health improving interventions. In reality, however, considerably more resources are channeled towards making these services available (supply-side), while little attention is paid to efforts aimed at understanding factors that might influence uptake of these same services (demand-side) (1). As a result, despite significant investments in Maternal and Child Health (MCH) programs, several low and middle income countries failed to reach their Millennium Development Goals (MDGs) targets for MCH (2). With the transition to Sustainable Development Goals (SDGs) and the ambitious target of Universal Health Coverage (UHC), factors that influence patient choice are now being revisited (3).

However, recent evidence shows that patient choice is more complex than initially thought. Traditional public health approaches assumed that providing health services nearer to where people lived and making them free to use was the most important driver of service utilization (4, 5). Empirical findings proved this to be true in many low- and middle-income countries where expanding coverage of health services and/or abolishing user fees led to a corresponding increase in service utilization (1, 6, 7). Notwithstanding this evidence, a different trend was also observed; one in which a patient was willing to travel farther and pay more to seek healthcare they prefer (8, 9). Clearly, making health services free to use and nearer patient homes are not enough reasons to guarantee maximum service uptake.

In order to understand other factors that drive patient choice/decisions, this paper will attempt to assess the role that patient-perceived quality of healthcare plays in influencing a patient's decision to bypass one health facility for another.

Patient-perceived quality of healthcare is a broad and vaguely defined term but it has been clearly linked to measurable constructs such as the technical quality of care a patient received (10-12) or expects to receive (13, 14), the health facility characteristics (15), and certain labels that serve as proxies for perceived quality (16). This paper utilizes these constructs to assess the link between patient-perceived quality of healthcare and patient bypassing behavior. It will use data from two different types of health services – acute sick-child care (an example of acute care) and Antenatal Care (a preventive service) – collected from nine low- and middle-income countries.

Through the analysis, the paper will explore the importance of the various quality constructs in influencing bypassing behavior. The paper will also highlight ways health managers and policy makers can leverage this behavior to channel patients towards more appropriate use of health services.

4.1.1 Literature Review

Bypassing occurs when a patient does not seek healthcare at the healthcare facility closest to him/her but rather chooses to seek healthcare at a different health facility further away (8, 17). Health service researchers around the world have been concerned about the phenomenon of bypassing for a long time. However, while the issue was largely ignored in low- and middle income countries until recently, it captured the attention of policy makers interested in planning for rural health care in high income countries. The central focus of these research studies was to predict why people living in rural areas of high income countries would bypass their rural health facilities to seek health care in urban areas. Central to this line of research was a concern for the financial viability of the health facilities that were being bypassed and an interest in developing methods to stop or reduce bypassing (18-23).

On the other hand, in low- and middle-income countries, the initial focus was on expanding coverage of essential health interventions (4, 5). This approach was largely driven by the assumption that making services available was sufficient in itself to guarantee uptake. It is easy to see why this approach was adopted as bypassing only becomes a problem when there are at least enough health facilities for people to bypass. Today, with the rapid gains in coverage expansion, achieved largely through provision of free services, the bypassing phenomenon has started garnering greater attention.

However, the earliest studies did not address bypassing directly. In a household survey in rural Kenya, Mwabu explored non-monetary aspects of health facility choice and found that most patients sought healthcare outside the government health facilities, which provided free healthcare at the time (24). In a separate study, Mwabu also showed that patients seemed to be making health facility choices based on "unobserved or unmeasured clinic-specific attributes" (25). A different study of rural households in Nigeria found that after controlling for quality, price was a significant predictor of health facility choice (26).

The Akin and Hutchinson study on household health facility choice in Sri-Lanka is the earliest we identified that focused on bypassing as a health-policy concern in low- and middle-income countries (8). The study described the concept and tried to understand why people (especially the poor) would bypass nearby health facilities that provide free services and instead choose to travel further in search of (an often pay for) healthcare. Expectedly, they found that several factors including income, severity of illness, and density of health facilities played significant roles in determining if a health-facility is bypassed by a patient or not. In addition, they found that compared to health facilities that were bypassed, health facilities not bypassed scored higher on key aspects of service readiness such as availability of medicines, doctors, and opening times. This study brought to light the sophisticated decision making process households in low- and middle-income countries face in seeking healthcare.

Subsequently, several studies have explored bypassing in low- and middle income countries. Not surprisingly, bypassing has been found to be associated with lower quality of care in the bypassed facility (9, 10, 27-32), severity of the medical condition or maternal parity (28-30, 33), insurance coverage (34), and patient's socio-economic status (10, 34, 35). A different type of bypassing behavior was also described in Chad where poor patients were found to bypass higher quality health facilities to seek care at lower quality facilities that provide services for free or at reduced prices (27).

These studies explored bypassing within the context of a single healthcare service: pregnancy and childbirth, sick-child care, emergency-room care, and outpatient-care. They also explored bypassing at the sub-national level, within narrowly defined geographical regions. It is therefore, difficult to generalize their findings to other geographic settings or safely assume that the measures of quality adopted for one service would apply for other services. This study attempts to fill this gap by adopting similar measures of quality for two different healthcare services, and evaluating the link between these measures of quality and bypassing across nine different countries.

4.1.2 Objectives of the Study

The main research question this study tries to answer is this: "Do perceptions of quality influence bypassing behavior?". In addition, this study will test to see if the relationship between perceptions of quality and bypassing behavior is influenced by any other factors.

4.2 Conceptual Framework

This study explores the link between patient-perceived quality of healthcare and bypassing behavior. We assume that a patient's perception of the quality of healthcare provided at a given health facility is formed by learning about important characteristics of that health facility. The learning could be direct (e.g. previous personal experience), or indirect (e.g. from other people experience). Our model is indifferent to the source of information, but assumes that all learning will lead the patient to form an opinion about the level of quality provided by each health facilities she has access to. We also assume that over time, a patient learns to associate certain health facility characteristics with better health outcomes and will subsequently use these characteristics as proxies in healthcare decision-making processes. We refer to these proxies as labels and include examples like "hospitals", "health posts", "Government-owned", or "Private". These proxies serve as signals that convey information to patients about what to expect from a healthcare visit to a given facility.

For every episode of care, we assume that a patient aims to maximize her utility by seeking care from the health facility most likely to provide her with the best quality of care that she can afford. Therefore, a patient seeking higher quality healthcare will prefer to visit health facilities that fare better on one or more of the quality signals they consider important. This might entail bypassing health facilities located nearer to their homes but which have lower perceived-quality, and choosing to travel further to seek care at health facilities with better perceived quality.

4.2.1 Signals of Healthcare Quality

We specifically model four quality signals namely: 1) Technical quality 2) Structural quality, 3) Health facility type, and 4) Ownership/Management type. Each of these represent different ways a patient might choose to assess (or learn about) quality of healthcare. We describe each quality signal and how they might influence a patient's decision to bypass.

1. **Technical quality:** The quality of care actually received during a healthcare visit is arguably the most important factor that determines if the patient will get better or not. This usually is comprised of the patient interview by the health worker, a physical examination, some laboratory investigations, and a treatment plan. Due to the information asymmetry that exists between health workers and patients, a patient is often not able to accurately judge the quality of care they receive (36). However, for commonly used services (e.g. ANC, or IMCI), it is reasonable to expect that over time, patients would come to expect a certain level of quality that closely maps to the standard protocols and guidelines. For this study, we measure facility-level technical quality for ANC as an index of average adherence to the World Health Organization Antenatal Care guidelines (37), and for acute sick-child care we used an index of average adherence to the WHO guidelines on Integrated Management of Childhood Illnesses (38).
2. **Structural quality:** Patients routinely express preferences for health facilities with certain visible characteristics that signal capacity to provide good quality care (11, 17). These include the physical structure, equipment, supplies, utilities etc. A patient, making assessments of the quality of care they expect to receive at a given facility will therefore prefer to seek care at health facility that scores high for structural quality. In this study, we defined structural quality using the WHO general service readiness index (39) and computed scores for each health facility based on results of health facility audits. Although there are other visible characteristics that might be important contributors to patient-perceived quality of care, our dataset would not allow us to explore them.
3. **Health facility type:** In most low and middle income countries, health facilities are organized based on their capacity to handle health conditions of differing complexities. At the top of the hierarchy, are hospitals equipped to deal with complex health conditions while

health posts occupy the lowest categories and therefore address the simplest of conditions. In many instances, these differences go beyond their predetermined capacity to also include their mode of operations and quality of services offered. So, patients learn to expect better quality healthcare from hospitals.

4. **Ownership/management type:** The type of ownership or management structure operated by a health facility directly affects the quality of care it provides. Factors such as adequate supervision, good financial/administrative practices, and quality assurance approaches have been shown to have big positive impact on the quality of care provided at a health facility (40). In low- and middle-income countries where there are clear differences in the management practices adopted by different health facilities, patients may begin to associate certain ownership/management models with better quality.

We therefore posit that if the quality signals described above factor into a patient's decision-making process, then for any random sample of health seekers at a given health facility, the odds of being a bypasser in that health facility would increase with increasing quality (structural or technical). Furthermore, the odds of being a bypasser would be higher if the health facility carried any of the labels patients might use as proxies for quality e.g. hospital, private.

4.3 Methods

4.3.1 Study design and Setting

We used data from Service Provision Assessments (SPA) conducted in nine low- and middle-income countries in Africa, South-East Asia and Latin America (see Table 4-1). SPA's are cross-sectional health facility assessments conducted to provide nationally representative data on health care delivery and quality of health service provision in a country. SPA's also include direct observations of patient-provider interactions, as well as patient exit interviews to assess patient experience. SPA surveys routinely collect data for multiple healthcare services including antenatal care (ANC), sick-child care, family-planning, HIV/AIDS care, prevention of mother to child transmission of HIV etc. Details of the design and conduct of SPAs have been described elsewhere (41).

For this study, we analyzed most recent data on ANC and acute sick-child care from nine countries. We created a pooled dataset for each service comprising of data from all nine countries. Where data from multiple survey years were available for any particular country, we only included the most recent survey year in our analysis. For ANC, we analyzed data from Haiti (2013), Kenya (2010), Malawi (2013), Namibia (2009), Nepal (2015), Rwanda (2007), Senegal (2014), Tanzania (2015), and Uganda (2007) while for acute sick-childcare, we analyzed data from Haiti (2013), Kenya (2010), Malawi (2013), Namibia (2009), Nepal (2015), Rwanda (2007), Senegal (2015), Tanzania (2015), and Uganda (2007).

Table 4-1. Countries included in analysis of the association between perceived quality and bypassing

		Antenatal Care (ANC)		Sick Child Care: Integrated Management of Childhood Illnesses (IMCI)	
Country	**Survey Year**	**Number of Participants**	**Number of Health Facilities**	**Number of Participants**	**Number of Health Facilities**
Haiti	2013	1,563	447	2,362	630
Kenya	2010	1,390	395	1,893	512
Malawi	2013	2,063	412	3,312	746
Namibia	2009	856	179	1,530	297
Nepal	2015	1,487	459	2,151	667
Rwanda	2007	717	152	1,659	433
Senegal*	2014	1,176	300	-	-
Senegal*	2015	-	-	1,231	329
Tanzania	2015	3,903	814	4,835	1,012
Uganda	2007	761	207	1,016	319
Total		**13,916**	**3,365**	**19,989**	**4,945**

* The most recent ANC data for Senegal was collected in 2014.

4.3.2 Health facilities and Participants

Health facilities included in the SPA surveys were randomly selected from a comprehensive list of health facilities in each country. This comprehensive list includes all formal-sector health facilities that provide healthcare, but excludes individual doctors' offices and pharmacies. Samples were collected to provide data representative at the national level for the following categories: facility type, and managing authority (private-owned vs. government-owned). Due to the relatively low number of hospitals in each country, hospitals were oversampled in each survey.

In each health facility visited, a health facility audit using a standardized inventory questionnaire was conducted. In addition, separate interviews were conducted for patients and health workers. At least one health worker was interviewed for each healthcare service available at a sampled health facility. Interviewers also observed a sample of patient-provider consultation visits to assess the quality of the interaction. Finally, patient-exit interviews were conducted for a random sample of patients from each provider assessed. All participants included in the survey were physically present at the health facility on the day of the survey.

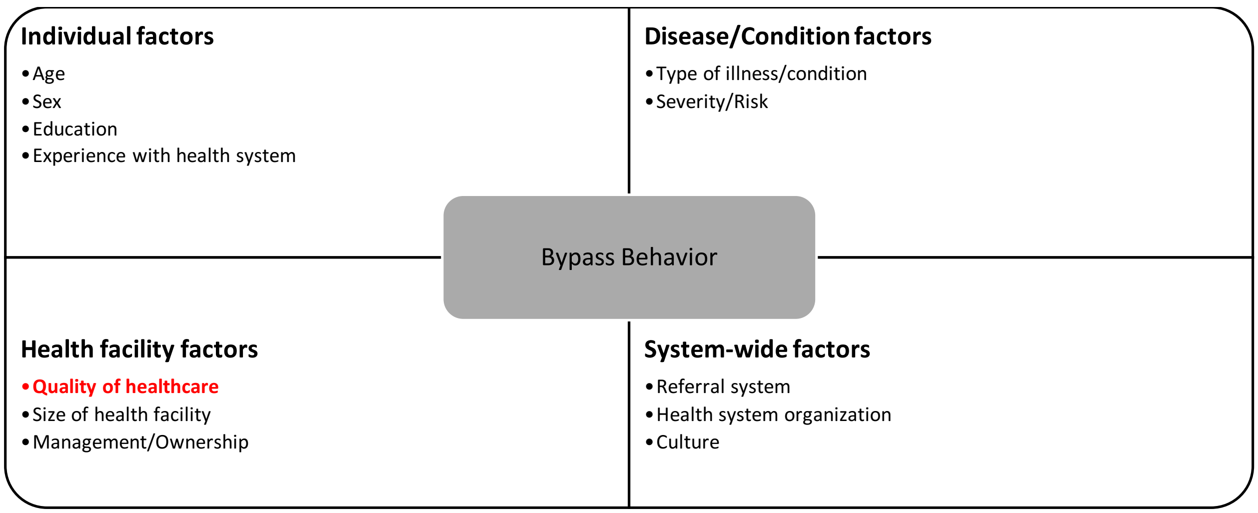

Figure 4-1. Groups of factors that influence bypass behavior

4.3.3 Variables

Figure 4-1 lists the different groups of variables that influence bypassing while Table 4-2 describes the variables included in this study. The main outcome variable of interest in this study is bypassing. Patients were asked in SPA surveys if the health facility they visited for the index visit was the closest to their home. A patient who answered no to this question was classified as a bypasser while others were classified as non-bypassers. Survey participants were also asked if they bypassed as a result of a medical referral or for other reasons. All bypassers who bypassed as a result of a medical referral were excluded from our analysis as they would not be true reflections of patient choice.

Our primary independent variable of interest is patient-perceived quality of healthcare for a health facility. We assumed that patient-perceived quality of healthcare is a function of the average quality of health care provided at that health facility (technical quality) and the level of preparedness of the facility to provide the required health-service (structural quality). We measured technical quality by creating a technical quality index from direct observation of patient-provider consults while structural quality was measured by creating a general service readiness index from the health facility inventories.

Technical Quality Index (TQI): The Technical Quality Index (TQI) measures how much a provider adheres to the prescribed guidelines for providing the service of interest. For both services (ANC and acute sick-child care) we calculated a technical quality score for each patient-provider encounter. This was calculated as the number of guideline items met divided by the expected total number of guideline items. Individual technical quality scores were aggregated at the facility-level to obtain a facility technical quality score for each health facility. Finally, in order to make results easier to interpret, demeaned facility technical quality scores were calculated for each health facility (and for each service) by subtracting the average facility technical quality score for all facilities from each facility's technical quality score. Technical quality scores for ANC were calculated using WHO's guidelines on Focused ANC (37) while Technical quality scores for acute sick-child care were calculated using WHO's guidelines for Integrated Management of Childhood Illnesses (IMCI) (38).

General Service Readiness (i.e. structural quality) Index (GSRI): The GSRI measures how prepared a health facility is to provide the requested health service. The World Health Organization (WHO) measures this through facility censuses that assess the presence of equipment, supplies, and other factors necessary to provide each service (42). We adopted WHO's measure and calculated our index using data from the health facility audits. A general service readiness score was calculated for each health facility. In order to make results easier to interpret, demeaned general service readiness scores were then calculated for each heath facility by subtracting the average general service readiness score from each facility's general service readiness score.

Hospitals and Non-Hospitals: We defined hospitals as any health facility categorized as a hospital in the survey dataset. We defined non-Hospitals to include all other health facilities including not labeled as hospitals. These include health posts, dispensaries, health centers, clinics, and large health centers.

Ownership/Management: Health facilities owned and managed by the government were categorized as government-owned, while private health facilities included all other health facilities not managed by the government including private for-profit health facilities, and private non-profit health facilities.

Other variables used in the analysis for ANC include age in years, educational status (None/Any Primary/Any Secondary/Post-Secondary), ANC Type (First ANC/Follow-up ANC). Other variables included in the analysis for acute sick-child care include, age of child in months, age of caregiver in years, educational status of caregiver, number of symptoms in child. Table 2 summarizes all the variables and their definitions.

Table 4-2: Variables included in the study and their definitions

	Description/Measurement	Health Service
Outcome variable		
Bypasser	Any patient who answered yes to the question: "Is this the closest health facility to your home?"	ANC and IMCI
Health Facility Variables		
ANC Technical Quality	A measure of the proportion of ANC guideline items met/performed. Captured from direct observation of patient-provider interactions	ANC only
IMCI Technical Quality	A measure of the proportion of IMCI guideline items met/performed. Captured from direct observation of patient-provider interactions	IMCI only
Structural Quality: General Service Readiness Index	A measure of a health-facility's preparedness to provide essential health services. Captured through health facility audits during service provision assessment surveys	ANC and IMCI
Hospital (vs. Non-Hospital)	Health facilities providing the highest level of care. They meet the WHO size and service availability definitions.	ANC and IMCI
Private (vs. Government-owned)	Government facilities are owned and managed by the government Private health facilities are not owned or managed by the government. Includes private for-profit and private non-profit	ANC and IMCI
Individual-level Variables		
Age (Mother)	Age of mother in years	ANC only
Age (Child)	Age of child in months	IMCI only
Caregiver's age	Age of sick-child's caregiver	IMCI only
Sex (child)	Sex of child	IMCI only
Number of Symptoms	Number of illness symptoms the sick child had when taken to the hospital	IMCI only
First ANC Visit	Yes, for first-ANC visits. No, for follow-up ANC visits	ANC only
Educational status	Highest level of education attained. Levels are: No education, Any primary education, Any secondary education, Any post-secondary education	ANC and IMCI
Others		
Urban (vs. Rural)	Health facility is located in an urban area	ANC and IMCI

* ANC = Antenatal care, IMCI = Integrated Management of Childhood Illnesses

4.3.4 Statistical methods

We conducted separate multi-level analysis for ANC and acute sick-child care. For each service, we first conducted simple regressions of bypassing on each of the variables of interest. We then fit two-level random intercept models of bypassing on individual- and facility-level covariates while controlling for country/survey (see equation 2). We also conducted sub-group analysis to test for differences in bypassing behavior by rural/urban, facility type (hospital/non-hospital) private/government. We also conducted a separate sub-group analysis by ANC Type.

$$Logit\ Bypass_{ij} = \beta_0 + \beta_1 TQ_j + \beta_2 GSR_j + \beta_4 X_{1ij} + \beta_5 X_{2j} + u_j + e_{ij}, \qquad (2)$$

Where, TQ is the average technical quality score for facility j, GSR is the general service readiness score for facility j, X_1 is a vector of individual-level covariates for individual i in facility j (including mother's age, child's age, education, child's sex, and number of symptoms), X_2 is a vector of facility-level covariates for facility j (including hospital/non-hospital, private/government-owned), $u_j \sim N(0, \sigma_u^2)$, and $e_{ij} \sim N(0, \sigma_e^2)$

4.4 Results

4.4.1 Participants

A total of 14,386 patients who received ANC from 3,378 facilities and 20,790 patients who received IMCI care from 4,978 facilities were eligible for inclusion in our study. Of these, we excluded 275 ANC patients and 363 IMCI patients who bypassed because of medical referrals. We also excluded 195 ANC patients and 489 IMCI patients with missing data on bypassing status. Our final analysis included 13,916 patients who received ANC from 3,365 facilities and 19,989 patients who received sick-child-care from 4,945 facilities.

4.4.2 Descriptive data

The average technical quality score for ANC facilities was 0.38 (SD: 0.15, range: 0 to 0.98) while the average technical quality score for IMCI facilities was 0.30 (SD: 0.14, range: 0 to 0.93). For structural quality, the average general service readiness score for ANC facilities was 0.66 (SD: 0.16, range: 0.11 to 1.0) while the average general service readiness score for IMCI facilities was 0.63 (SD: 0.16, range: 0.11 to 1.00).

The average age of patients who received ANC was 25.5 years (SD 6.1; Range 11 to 68 years). Sixty-seven percent (67%) of the women were considered literate as they could read or write. Twenty percent (20%) of women attending ANC had no formal education, 46% had received primary education, 29% had received secondary education, and 5% had received post-secondary education. 43% of the women were visiting the clinic for their first ANC appointment. 32% of observations were in hospitals while 68% of observations were seen in non-Hospitals (e.g. large health centers, clinics, health posts, dispensaries). 73% of ANC observations were seen in government-owned facilities while 27% of ANC observations were from non-government facilities which included private for-profit and private non-profit facilities. Most women (62%) in the study were from rural regions. Haiti had the highest proportion of bypassers in ANC facilities at 27% while Rwanda had the lowest at 6%. The proportion of bypassers at ANC facilities in other countries were: Kenya (21%), Malawi (9%), Namibia (8%), Nepal (17%), Senegal (16%), Tanzania (15%), and Uganda (14%).

Table 4-3. Characteristics of patients receiving antenatal care (ANC) and the facilities they chose

Variable	Total (N=13,916) Mean, %	Bypassers (N=11,743) Mean, %	Non-Bypassers (N=2,173) Mean, %	p-value. H0: Diff = 0
Patient Characteristics				
Age (Mean/SD)	25.5	26.3	25.3	<0.001
Education				
No Education	*20*	16	21	<0.001
Primary	46	39	47	<0.001
Secondary	29	36	28	<0.001
Post-secondary	5	10	4	<0.001
Facility/Service Characteristics				
First ANC	43	43	43	0.6186
Hospital	32	48	29	<0.001
Private	27	41	24	<0.001
Country				
Haiti (2013)	11	20	10	
Kenya (2010)	10	15	9	
Malawi (2013)	15	8	16	
Namibia (2009)	6	3	7	
Nepal (2015)	11	11	11	
Rwanda 2007	5	2	6	
Senegal (2014)	8	9	8	
Tanzania 2015	28	27	28	
Uganda 2007	6	5	5	

Table 4-4: Characteristics of children seeking acute sick child care (IMCI) and the health facilities they chose

Variable	Total (N=19,989) Mean, %	Bypassers (N=3,342) Mean, %	Non-Bypassers (N=16,647) Mean, %	p-value. H0: Difference = 0
Individual Characteristics				
Age in months (child)	20.8	21.5	20.7	
Sex (child) 1=female, 0=male	48	47	48	0.2166
Age (caregiver)	28.2	28.6	28.1	0.0031
Education (caregiver)	-			
No Education	21	15	23	<0.001
Any Primary	46	41	47	<0.001
Any Secondary	8	35	27	<0.001
Any Post-Secondary	4	9	3	<0.001
No of complaints/reasons for visit (max = 8)	2.7	2.8	2.7	<0.001
Facility Characteristics				
Hospital	24	40	21	<0.001
Private	28	51	24	<0.001
Country				
Haiti (2013)	12	19	11	
Kenya (2010)	9	12	9	
Malawi (2013)	17	14	17	
Namibia (2009)	8	4	8	
Nepal (2015)	11	8	11	
Rwanda 2007	8	4	9	
Senegal (2015)	6	6	6	
Tanzania 2015	24	28	23	
Uganda 2007	5	4	5	

The average age of children seeking IMCI services was 21 months (SD 16 months) while the average age of the caregiver was 28 years (SD 8 years). Forty-eight percent (48%) of the children were girls, and 91% of caregivers were female. The average number of symptoms children suffered from was 2.7 (SD 1.3), and 28% of children had a danger sign that required advanced care at the time they visited the clinic. Haiti had the highest proportion of bypassers in IMCI facilities at 27% while Rwanda had the lowest proportion at 8%. The proportion of bypassers in other countries were: Kenya (20%), Malawi (14%), Namibia (10%), Nepal (12%), Senegal (15%), Tanzania (20%), and Uganda (14%).

4.4.3 Outcome data

15.6% of the ANC population bypassed their nearest health facility on the day of the survey while 16.7% of the IMCI population bypassed. For ANC, bypassers were more prevalent in hospitals (23.8%) compared to non-Hospitals (11.8%), more common in privately-owned facilities (24.1%) than in government-owned facilities (12.5%), and more common in urban locations (21.8%) than rural locations (12.1%). IMCI showed a similar picture with bypassers more prevalent in hospitals (27.2%) compared to non-Hospitals (13.3%), more common in privately-owned IMCI facilities (30.1%) than in government-owned facilities (11.5%), and more common in urban IMCI facilities (28.8%) than in rural IMCI facilities (13.9%).

Table 4-5. Summary of regression coefficients of the association between measures of quality perceptions and bypassing behavior for ANC and IMCI

	ANC †		IMCI †	
	Base model	**Full model**	**Base model**	**Full model**
Technical Quality Index	0.92 (0.05)	0.94 (0.05)	1.16** (0.05)	1.07 (0.04)
General Service Readiness Index	1.85** (0.08)	1.40** (0.08)	2.06** (0.07)	1.47** (0.07)
Hospital (vs. non-hospital)	-	1.52** (0.17)	-	1.53** (0.15)
Private (vs public)	-	1.81** (0.17)	-	3.02** (0.23)

* p < 0.05, ** p< 0.01

† Full model for ANC included variables for mother's age, age squared, mother's education, and type of ANC (first/follow-up). Full model for IMCI included variables for child's age, caregiver's age, caregiver's age squared, caregiver's education, number of symptoms at visit. Base models for both ANC and IMCI included variables for technical quality and GSRI only.

4.4.4 Main findings for ANC

Tables 4-5 and 4-7 show results of the two-level random intercept models for ANC. Model 0 and Model 5 represent the base and fully specified models respectively, while Models 1-4 represent different forms of the reduced model with controls for individual- and facility-level factors.

We found that structural quality, measured as General Service Readiness Index (GSRI), was a significant predictor of bypassing in all models (reduced and fully specified). In the reduced model with only structural and technical quality, the odds ratio for GSRI was 1.85 (95% CI: 1.69, 2.03) suggesting that among the health facilities in our study, for every increase in GSRI by one standard deviation, the odds of being a bypasser increases by 85%. This effect-size reduces in the fully specified model with an odds ratio of 1.4 (95% CI: 1.26, 1.57), suggesting that the odds of being a bypasser in a facility increases by 45% for every one standard deviation increase in GSRI, after controlling for individual and facility-level factors. Conversely, technical quality was not a significant predictor of bypassing with an odds ratio of 0.92 (95% CI: 0.84, 1.02) in the base model, and 0.94 (95% CI: 0.85, 1.04) in the fully specified model.

Mother's age and mother's education status were found to be significant individual-level predictors of bypassing. The results of the full ANC model show that for every increase in the age of the mother by one standard deviation, the odds of being a bypasser increases by 2% (OR: 1.02; 95% CI: 1.01, 1.04) after controlling for other factors. For mother's education, the results suggest a gradient with increasing odds of being a bypasser as the level of education increases. Compared to mothers with no education, mothers with some primary education did not have significantly higher odds of bypassing (OR 1.09: 95% CI: 0.90, 1.31). However, mothers who had secondary education were 36% more likely to be bypassers (OR: 1.36; 95% CI: 1.11, 1.67), while mothers with post-secondary education were 60% more likely to be bypassers (OR: 1.60; 95% CI: 1.19, 2.14) after controlling for other factors.

Both facility-level variables (type of facility, and facility ownership/management), and type of ANC visit were significant predictors of bypassing. The odds of being a bypasser was 16% (OR: 1.16; 95% CI: 1.03, 1.32) higher if it was the first ANC visit than if it was a follow-up ANC visit. In the same vein, the odds of being a bypasser was 52% higher (OR: 1.52; 95% CI: 1.22, 1.90) in hospitals compared to non-hospitals while the odds of being a bypasser was 81% higher (OR: 1.81; 95% CI: 1.52 to 2.17) in privately-owned health facilities compared to government-owned health facilities.

Table 4-6. Summary of regression coefficients from sub-group analysis of the association between measures of quality perceptions and bypassing behavior for ANC and IMCI

	Hospitals	Non-Hospitals	Public	Private	Rural	Urban	First ANC	Follow-up ANC
	Odds Ratio (SE)	**Odds Ratio (SE)**	**Odds Ratio (SE)**	**Odds Ratio (SE)**	**Odds Ratio (SE)**	**Odds Ratio (SE)**	**Odds Ratio (SE)**	**Odds Ratio (SE)**
Antenatal Care (ANC)								
ANC Technical Quality Index	0.97 (0.08)	0.94 (0.06)	0.97 (0.06)	0.91 (0.07)	0.98 (0.09)	0.76* (0.08)	0.95 (0.07)	0.94 (0.06)
General Service Readiness Index (WHO)	1.18* (0.09)	1.44** (0.08)	1.33** (0.09)	1.56** (0.15)	1.53** (0.15)	1.38** (0.13)	1.28** (0.09)	1.45** (0.11)
Integrated Management of Childhood Illnesses (IMCI)								
IMCI Technical Quality Index	1.09 (0.07)	1.08 (0.06)	1.08 (0.06)	1.06 (0.07)	1.10 (0.06)	1.02 (0.06)	-	-
General Service Readiness Index (WHO)	1.14* (0.07)	1.51** (0.07)	1.60** (0.09)	1.29** (0.09)	1.55** (0.11)	1.12 (0.08)	-	-

Table 4-7. Association between measures of quality perceptions and bypassing behavior for ANC

	Model 0 (Base)	Model 1	Model 2	Model 3	Model 4	Model 5
	Odds Ratio (SE)	**Odds Ratio (SE)**	**Odds Ratio (SE)**	**Odds Ratio (SE)**	**Odds Ratio (SE)**	**Odds Ratio (SE)**
ANC Technical Quality Index		0.92 (0.05)	0.93 (0.05)	0.92 (0.05)	0.92 (0.05)	0.94 (0.05)
General Service Readiness Index		1.85** (0.08)	1.73** (0.08)	1.74** (0.08)	1.55** (0.09)	1.40** (0.08)
Client's Age			1.03** (0.01)	1.03** (0.01)	1.03** (0.01)	1.02** (0.01)
Client's Age (squared)			1.0** (0.001)	1.0* (0.001)	1.00** (0.001)	1.00** (0.001)
Education (Ref: No education)						
Primary			1.1 (0.10)	1.11 (0.11)	1.1 (0.10)	1.09 (0.10)
Secondary			1.4* (0.15)	1.42** (0.15)	1.40** (0.15)	1.36** (0.14)
Post-Secondary			1.74** (0.26)	1.77** (0.27)	1.72** (0.26)	1.60** (0.24)
First ANC				1.17* (0.07)	1.17* (0.07)	1.16* (0.07)
Hospital (vs. non-hospital)					1.48** (0.17)	1.52** (0.17)
Private (vs Public)						1.81** (0.17)

** $p < 0.01$, * $p<0.05$
All models controlled for country and survey year

Table 4-7 (Continued). Association between measures of quality perceptions and bypassing behavior for ANC

	Model 0 (Base)	Model 1	Model 2	Model 3	Model 4	Model 5
	Odds Ratio (SE)	Odds Ratio (SE)	Odds Ratio (SE)	Odds Ratio (SE)	Odds Ratio (SE)	Odds Ratio (SE)
Constant	0.25** (0.03)	0.27** (0.03)	0.23** (0.03)	0.21** (0.03)	0.19** (0.03)	0.19** (0.03)
Random-effects parameter (Variance Constant)	2.17	1.91	1.75	1.75	1.75	1.75
Observations	13,916	13,916	13,705	13,705	13,705	13,705
Number of groups (facilities)	3,365	3,365	3,361	3,361	3,361	3,361

** p < 0.01, * p<0.05
All models controlled for country and survey year

4.4.5 Sub-group analysis for ANC

We also conducted sub-group analysis for the following subgroups: hospitals/non-hospitals, government-owned/private-owned, rural/urban, and first-ANC/follow-up-ANC. We highlight only relevant findings below, details can be found in tables 4-6 and 4-8.

In the sub-group analysis of hospitals and non-hospitals, we found no important differences in the association between technical quality and bypassing or the association between structural quality and bypassing. However, the results showed that maternal age and educational status were significant predictors of bypassing among hospitals but were not significant predictors of bypassing among non-hospitals. The results also showed that the type of ANC visit was a significant predictor of bypassing in non-hospitals but not in hospitals. In non-hospitals, patients attending first-ANC visits had 19% (OR 1.19; 95% CI: 1.02, 1.40) higher odds of bypassing, but there was no significant association between first-ANC visits and bypassing in hospitals (OR 1.14; 95% CI: 0.94, 1.37).

Among government-owned ANC facilities, first-ANC (OR 1.21; 95% CI: 1.04, 1.41) and hospitals (OR 1.68; 95% CI: 1.26, 2.25) were significant predictors of bypassing. But among private-owned ANC facilities, both first-ANC visits and hospitals were not significant with odds ratios of 1.08 (95% CI: 0.88, 1.32) and 1.21 (95% CI: 0.86, 1.73) respectively. On the other hand, mother's age was a significant predictor of bypassing in private facilities but not in government-owned facilities (OR 1.01; 95% CI: 0.99, 1.02).

Our sub-group analysis for rural/urban location was restricted to the four countries with data on rural/urban locations. We excluded observations from all five countries without the rural/urban marker. We analyzed 8,540 ANC observations from 1,972 health facilities. Structural quality was a significant predictor of bypassing in both urban (OR 1.38; 95% CI: 1.14, 1.67), and rural (OR 1.53; 95% CI: 1.26, 1.85) health facilities. However, technical quality was a significant predictor of bypassing in urban health facilities (OR 0.76; 95% CI: 0.62, 0.94) but not in rural health facilities (OR 0.98; 95% CI: 0.82, 1.17). The direction of the effect of technical quality on bypassing suggests that increased technical quality reduces the odds of being a bypasser, which is counter-intuitive to what we would expect. In addition, among urban ANC health facilities, hospitals (OR 1.54; 95% CI: 1.06, 2.24) and private-owned (OR 2.37; 95% CI: 1.69, 3.33) health facilities were significant predictors of bypassing. In contrast, among rural ANC facilities, hospitals (OR 1.27; 95% CI: 0.79, 2.05) and private-owned (OR 1.11; 95% CI: 0.79, 1.54) health facilities were not significant predictors of bypassing.

Table 4-8. Sub-group analysis of the association between measures of quality perceptions and bypassing behavior for ANC

Models:	Hospitals	Non-Hospitals	Public	Private	Rural	Urban	First ANC	Follow-up ANC
	Odds Ratio (SE)	**Odds Ratio (SE)**	**Odds Ratio (SE)**	**Odds Ratio (SE)**	**Odds Ratio (SE)**	**Odds Ratio (SE)**	**Odds Ratio (SE)**	**Odds Ratio (SE)**
ANC Technical Quality Index	0.97 (0.08)	0.94 (0.06)	0.97 (0.06)	0.91 (0.07)	0.98 (0.09)	0.76* (0.08)	0.95 (0.07)	0.94 (0.06)
General Service Readiness Index	1.18* (0.09)	1.44** (0.08)	1.33** (0.09)	1.56** (0.15)	1.53** (0.15)	1.38** (0.13)	1.28** (0.09)	1.45** (0.11)
Client's Age (centered)	1.04** (0.01)	1.01 (0.01)	1.01 (0.01)	1.05** (0.01)	1.02* (0.01)	1.04** (0.01)	1.03** (0.01)	1.02** (0.01)
Client's Age (squared)	1.00 (0.001)	1.00* (0.001)	1.00 (0.001)	1.00** (0.001)	1.00* (0.001)	1.00 (0.001)	1.00** (0.001)	1.00 (0.0.001)
Education (Ref: No education)								
Primary	1.27 (0.22)	1.01 (0.12)	1.05 (0.12)	1.21 (0.21)	1.05 (0.15)	1.38 (0.27)	0.99 (0.13)	1.23 (0.16)
Secondary	1.77** (0.32)	1.15 (0.15)	1.29* (0.16)	1.57* (0.30)	1.21 (0.21)	1.71* (0.36)	1.33* (0.19)	1.61** (0.23)
Post-Secondary	1.88** (0.40)	1.53 (0.43)	1.07 (0.24)	2.28** (0.54)	1.48 (0.78)	1.82* (0.51)	1.24 (0.30)	2.25** (0.42)
First ANC	1.14 (0.11)	1.19* (0.10)	1.21* (0.10)	1.08 (0.11)	1.05 (0.11)	1.10 (0.13)	-	-
Hospital (vs. non-hospital)	-	-	1.68** (0.25)	1.22 (0.22)	1.27 (0.31)	1.54* (0.29)	1.55** (0.23)	1.42* (0.20)
Private (vs Public)	1.91** (0.25)	1.69** (0.22)	-	-	1.11 (0.19)	2.37** (0.41)	1.70** (0.20)	1.86** (0.22)

** p < 0.01, * p<0.05
All models controlled for country and survey year

Table 4-8 (Continued). Sub-group analysis of the association between measures of quality perceptions and bypassing behavior for ANC

Models:	Hospitals	Non-Hospitals	Public	Private	Rural	Urban	First ANC	Follow-up ANC
	Odds Ratio (SE)	Odds Ratio (SE)	Odds Ratio (SE)	Odds Ratio (SE)	Odds Ratio (SE)	Odds Ratio (SE)	Odds Ratio (SE)	Odds Ratio (SE)
Constant	0.22** (0.06)	0.13** (0.02)	0.14** (0.03)	0.29** (0.07)	0.17** (0.04)	0.10** (0.03)	0.19** (0.04)	0.11** (0.02)
Random-effects parameter (SD Constant)	1.336 (0.189)	1.917 (0.213)	1.878 (0.027)	1.298 (0.217)	2.112 (0.317)	1.609 (0.263)	1.447 (0.218)	1.863 (0.2206)
Observations	4,390	9,315	10,000	3,705	5,288	3,252	5,922	7,783
Number of groups	869	2,492	2,407	957	1,323	649	2,425	2,698

** p < 0.01, * p<0.05
All models controlled for country and survey year

Comparing first-ANC to follow-up-ANC, we found a significantly stronger effect of education in predicting bypassing for follow-up ANC compared to first-ANC. In the sub-group of follow-up ANC visits, mothers with post-secondary education had a 125% higher odds of being bypassers (OR 2.25; 95% CI: 1.56, 3.24) compared to non-educated mothers, while the effect of post-secondary education was non-significant (OR 1.24; 95% CI: 0.76, 2.01) in the sub-group of first-ANC visits. On the other hand, mothers with secondary education had a 61% (OR 1.61; 95% CI: 1.22, 2.13) higher odds of bypassing compared to non-educated mothers among follow-up ANC visits, while the same association was non-significant (OR 1.33; 95% CI: 1.00, 1.75) among first-ANC visits.

4.4.6 Main findings for sick-child care

Tables 4-5 and 4-9 shows results of the two-level random intercept models of the association between patient-perceived quality of care and bypassing behavior in IMCI healthcare facilities. Model 0 and Model 5 represent the base and fully specified models respectively, while Models 1-4 represent different forms of the reduced model with controls for individual- and facility-level factors.

Similar to the ANC findings, we found that structural quality, measured as General Service Readiness Index (GSRI), was a significant predictor of bypassing in all models for IMCI care. However, in contrast to our findings for ANC, we found that technical quality, was a significant predictor of bypassing for IMCI care whereas it was not significant for ANC. In the model containing only quality of care variables (Model 1), the odds of bypassing increased by 106% (OR 2.06; 95% CI: 1.92, 2.22) for every increase in GSRI by one standard deviation, while in the fully specified model (Model 5), the odds of bypassing increases by 47% (OR 1.47; 95% CI: 1.34, 1.61) for every increase in GSRI by one standard deviation. The effect sizes reduced with the addition of control variables but remained significant in all models. In the case of technical quality for IMCI, the odds ratio was smaller compared to GSRI but nonetheless significant in the reduced models but lost significance in the fully specified model. The odds ratio reduced from 1.16 (95% CI: 1.06, 1.26) in the model containing only quality of care variables (Model 1) to 1.07 (95% CI: 0.99, 1.16) in the fully specified model.

Table 4-9. Association between measures of quality perceptions and bypassing behavior for IMCI

	Model 0 (Base)	Model 1	Model 2	Model 3	Model 4	Model 5
	Odds Ratio (SE)	**Odds Ratio (SE)**	**Odds Ratio (SE)**	**Odds Ratio (SE)**	**Odds Ratio (SE)**	**Odds Ratio (SE)**
IMCI Technical Quality Index		1.16** (0.05)	1.15** (0.05)	1.14** (0.05)	1.14** (0.05)	1.07 (0.04)
General Service Readiness Index		2.06** (0.07)	1.94** (0.07)	1.95** (0.07)	1.79** (0.08)	1.47** (0.07)
Child's Age			1.00 (0.002)	1.00 (0.002)	1.00 (0.002)	1.00 (0.02)
Caregiver's Age			1.01 (0.004)	1.00 (0.004)	1.00 (0.004)	1.00 (0.004)
Caregiver's Age squared			1.00 (0.0002)	1.00 (0.0002)	1.00 (0.002)	1.00 (0.0002)
Caregiver's Education (Ref: No education)						
Primary			1.14 (0.09)	1.15 (0.09)	1.15 (0.09)	1.12 (0.09)
Secondary			1.56** (0.13)	1.60** (0.13)	1.60** (0.13)	1.50** (0.12)
Post-Secondary			2.09** (0.26)	2.18** (0.28)	2.17** (0.28)	1.82** (0.23)
Number of Symptoms at visit				1.10** (0.02)	1.10** (0.02)	1.10** (0.02)
Hospital (vs. non-hospital)					1.37** (0.14)	1.53** (0.15)
Private (vs Public)						3.02** (0.23)

** $p < 0.01$, * $p<0.05$
All models controlled for country and survey year

Table 4-9 (Continued). Association between measures of quality perceptions and bypassing behavior for IMCI

	Model 0 (Base)	Model 1	Model 2	Model 3	Model 4	Model 5
	Odds Ratio (SE)	Odds Ratio (SE)	Odds Ratio (SE)	Odds Ratio (SE)	Odds Ratio (SE)	Odds Ratio (SE)
Constant	0.22** (0.02)	0.27** (0.02)	0.21** (0.02)	0.16** (0.02)	0.14** (0.02)	0.07** (0.01)
Random-effects parameter (SD Constant)	2.5	2.06	1.88	1.88 (0.135)	1.89	1.63
Observations	19,989	19,989	19,310	19,309	19,309	19,309
Number of groups (facilities)	4,945	4,945	4,913	4,913	4,913	4,913

** p < 0.01, * p<0.05
All models controlled for country and survey year

Of the individual-level variables analyzed, child's age, caregiver's educational status, and number of symptoms at presentation were found to be significant predictors of bypassing while caregiver's age was not a significant predictor of bypassing. Compared to caregivers with no education, caregivers with some primary education did not have significantly higher odds of bypassing (OR 1.92; 95% CI: 0.96, 1.30). However, caregiver's who had secondary education were 50% more likely to be bypassers (OR 1.50; 95%CI: 1.28, 1.76), while caregivers with post-secondary education were 82% more likely to be bypassers (OR 1.82; 95% CI: 1.43, 2.32) after controlling for other factors. The number of symptoms a child had at presentation was also found to be significant, with the odds of bypassing increasing by 10% (OR 1.10; 95% CI: 1.06, 1.14) for every unit increase in the number of sick symptoms a child had at presentation. By contrast, child's age was not significantly associated with bypassing (OR 1.00; 95% CI: 1.00, 1.01).

Both facility-level variables analyzed for sick-child care turned out to be significant predicators of bypassing after controlling for all other factors. The odds of bypassing was 53% (OR 1.53; 95% CI: 1.27, 1.85) higher in hospitals than in non-hospitals, while the odds of bypassing in privately-owned health facilities was 202% higher (OR 3.02; 95% CI: 2.59, 3.51) than in government-owned health facilities.

4.4.7 Sub-group analysis for sick-child care

We performed sub-group analysis for sick-child visits for the following sub-groups: hospitals/non-hospitals, private-owned/public-owned, rural/urban locations. We report relevant findings below while the reader can find a summary in Table 4-6 and details in Table 4-10.

Sub-group analysis of hospitals and non-hospitals reveal a significant association between structural quality (GSRI) and bypassing in non-hospitals (OR 1.51; 95% CI: 1.38, 1.65) but was not significant in hospitals (OR 1.14; 95% CI: 1.00, 1.29). By contrast, technical quality was not significantly associated with bypassing in both hospitals and non-hospitals. For sub-group analysis involving private/public facilities providing IMCI, the results show that among government-owned healthcare facilities being a hospital was a significant predictor of bypassing (OR 1.96; 95% CI: 1.52, 2.53) but not among private-owned healthcare facilities (OR 0.95; 95% CI: 0.72, 1.25).

Table 4-10. Sub-group analysis of the association between measures of quality perceptions and bypassing behavior for IMCI

	Hospitals	Non-Hospitals	Public	Private	Rural	Urban
	Odds Ratio (SE)	**Odds Ratio (SE)**	**Odds Ratio (SE)**	**Odds Ratio (SE)**	**Odds Ratio (SE)**	**Odds Ratio (SE)**
IMCI Technical Quality Index	1.09 (0.07)	1.08 (0.06)	1.08 (0.06)	1.06 (0.07)	1.10 (0.06)	1.02 (0.06)
General Service Readiness Index	1.14* (0.07)	1.51** (0.07)	1.60** (0.09)	1.29** (0.09)	1.55** (0.11)	1.12 (0.08)
Child's Age (centered)	1.00 (0.003)	1.00 (0.002)	1.00 (0.002)	1.00 (0.002)	1.00 (0.002)	1.00 (0.003)
Caregiver's Age (centered)	1.01* (0.01)	1.00 (0.01)	1.00 (0.01)	1.01* (0.01)	1.00 (0.01)	1.01 (0.01)
Caregiver's Age squared	1.00 (0.0003)	1.00 (0.0002)	1.00 (0.0002)	1.00 (0.0003)	1.00 (0.0003)	1.00 (0.0004)
Caregiver's Education (Ref: No education)						
Primary	0.89 (0.12)	1.24* (0.12)	1.09 (0.10)	1.17 (0.15)	1.19 (0.15)	0.82 (0.11)
Secondary	1.24 (0.17)	1.62** (0.17)	1.38** (0.14)	1.64** (0.21)	1.54** (0.22)	0.99 (0.14)
Post-Secondary	1.42* (0.25)	2.27** (0.42)	1.31 (0.26)	2.19** (0.38)	1.17 (0.41)	2.84** (0.24)
Number of Symptoms at visit	1.09** (0.03)	1.12** (0.03)	1.13** (0.03)	1.07* (0.03)	1.21** (0.04)	1.07* (0.03)
Hospital (vs. non-hospital)	-	-	1.96** (0.25)	0.95 (0.13)	0.77 (0.16)	1.58** (0.24)
Private (vs Public)	1.69** (0.19)	4.05** (0.42)	-	-	3.21** (0.48)	2.84** (0.36)

Table 4-10 (Continued). Sub-group analysis of the association between measures of quality perceptions and bypassing behavior for IMCI

	Hospitals	Non-Hospitals	Public	Private	Rural	Urban
	Odds Ratio (SE)	**Odds Ratio (SE)**	**Odds Ratio (SE)**	**Odds Ratio (SE)**	**Odds Ratio (SE)**	**Odds Ratio (SE)**
Constant	0.26** (0.06)	0.05** (0.01)	0.09** (0.02)	0.23** (0.04)	0.04** (0.01)	0.15** (0.03)
Random-effects parameter (SD Constant)	0.866 (0.122)	2.046 (0.173)	1.490 (0.148)	1.529 (0.174)	1.782 (0.210)	1.108 (0.158)
Observations	4,789	14,520	13,814	5,495	7,256	4,065
Number of groups	1,003	3,910	3,352	1,561	1,779	914

GSRI was a significant predictor of bypassing behavior within rural healthcare facilities providing IMCI (OR 1.55; 95% CI: 1.34, 1.79), but not among urban health facilities (OR 1.12; 95% CI: 0.98, 1.29). Technical quality was not a significant predictor of bypassing in both urban and rural health facilities. In addition, within urban areas, hospitals had a significantly higher odds of bypassing compared to non-hospitals (OR 1.58; 95% CI: 1.18, 2.12), but the picture was different in rural areas with no significant association between hospitals and bypassing behavior (OR 0.77; 95% CI: 0.51, 1.17).

4.5 Discussion

This study explored the relationship between patient-perceived quality of care and bypassing behavior. We found that patient-perceived quality of healthcare is an important predictor of bypassing behavior and that some other individual and health-facility factors may exert important effects on a patient's perception of quality, and thus their bypassing decision.

We found that 15.6% of all patients surveyed at ANC clinics and 16.7% of patients surveyed at IMCI clinics had bypassed the nearest facilities to their homes. However, these rates varied by country with rates for ANC ranging from a low of 6% in Rwanda to a high of 27% in Haiti, and rates for IMCI ranging from a low of 8% in Rwanda to a high of 27% in Haiti. This variation in bypassing rates reflect differences in the different country populations, and the organization and regulation of the different health systems. Nonetheless they also buttress the importance of our findings across all countries studied.

Our study highlights some interesting differences in the associations between bypassing and the different dimensions of quality measured. We found that in our fully specified models for both ANC and acute sick-child care, technical quality (measured as the technical quality index) was not a significant predictor of bypassing behavior while structural quality (measured as the general service readiness index) was a significant predictor of bypassing behavior. This suggests that in making health facility choices, individuals seem to weight health facility characteristics (such as presence of equipment or drugs) more highly than they weight the actual service experience. This is not surprising as patients have been shown to be poor judges of actual quality of care received and therefore rely on other visible characteristics (11, 43).

Education seemed to play a major role in determining bypassing behavior in the countries studied. We found a strong and consistent education gradient for both ANC and acute sick-child care, with the most educated patients (and caregivers) having the highest odds of being bypassers while the non-educated patients (and caregivers) had the lowest odds of being bypassers. We observed this trend in all models and in most of the sub-group analyses conducted.

In line with other findings in the literature, our results suggest that the illness condition/severity or the type of service sought plays a key role in patients' decision making. In this study, severity of the condition (measured as number of symptoms) was a significant predictor of bypassing behavior for acute sick-child care and the odds of being a bypasser in first-ANC clinics was significantly higher than the odds of being a bypasser at follow-up ANC clinics.

4.5.1 Health-facility labels and bypassing

We also explored the potential role certain health facility labels may play in patients' decisions to bypass. Our study focused on two sets of labels 1) Public vs. Private reflecting the ownership and management structure, and 2) Hospital vs. Non-Hospital, reflecting the designation of the facility based on size and other characteristics. We found very strong effect sizes for both sets of labels: Compared to public (government-owned) facilities, the odds of being a bypasser in a private facility was 81% higher for ANC, and 200% higher for acute sick-child care. Similarly, compared to non-hospitals, the odds of being a bypasser in a hospital was 52% higher for ANC and 53% higher for acute sick-child care. These findings, taken at face value suggest that patients have learned to associate these labels with some desirable characteristics of health facilities but we are unable to drill down further due to data limitations.

Sub-group analysis revealed some interesting findings. Among government-owned (public) facilities, hospitals were significantly associated with bypassing, but among privately-owned health facilities hospitals were not significantly associated with bypassing behavior. This likely suggests that even though patients may view being designated as a hospital as an important proxy for measuring quality, it may matter less to them if they know that the health facility is privately owned or managed. This would be the case if patients consider privately-owned healthcare facilities as providers of better quality healthcare. This assumption is plausible in the countries studied, as well as in many other low and middle income countries, where government-owned health facilities suffer from poor management, and provide lower quality care. It is therefore conceivable that patients learn over time to associate privately-owned facilities with better quality. Furthermore, since the continued existence of privately-owned facilities is tightly coupled to their ability to maintain high patient volumes, they have incentives to be more responsive to patient needs and therefore provide better service.

Another interesting finding from the sub-group analysis was that structural quality (measured as the general service readiness index) seemed to have a larger influence on bypassing behavior in non-hospitals compared to hospitals. This was true for both ANC and IMCI. One explanation for this might be that, hospitals, in general are more likely to have equipment and supplies for common illnesses. Therefore, the unique components of the general service readiness index weight less in the patient's assessment of quality of hospitals. It is also possible that other visible characteristics of hospitals such as its size, physical structure, waiting rooms etc., influence patients more than the items measured in the GSRI. Patients have been known to have higher perceived-quality for health facilities with better physical structures (11, 43, 44). On the other hand, for lower-level health facilities (non-hospitals) the presence or absence of any of the components on the general service readiness index would be more easily noticed and therefore play larger roles in patient-perceived quality of care.

4.5.2 Rural Urban differences

In urban areas, both technical and structural quality were significant predictors of bypassing for ANC but were not significant predictors of bypassing for IMCI. On the other hand, in rural areas, structural quality significantly predicted bypassing behavior for both IMCI and ANC while technical quality was not significantly associated with bypassing for either IMCI or ANC. Furthermore, for both ANC and IMCI, hospitals in urban areas were more likely to have bypassers compared to non-hospitals, but no significant difference was found between hospitals and non-hospitals in rural areas.

These findings might partly reflect differences in the organization of healthcare delivery in rural and urban regions. Higher density of health facilities such as occurs in urban regions might make it easier to bypass health facilities compared to rural regions where hospitals are sparse and therefore the costs of bypassing are higher. Moreover, in urban areas, privately-owned health facilities were more likely to have bypassers for both ANC and IMCI. By contrast, in rural areas, private-facilities were significantly associated with bypassing for IMCI but not for ANC. This may further reflect the ease of bypassing in urban areas compared to rural areas and the complexity of patient decision making. For example, we would expect that since the ease of bypassing in urban areas is lower, patients will bypass more frequently. However, in rural areas where the cost of bypassing is much higher, patients might be more willing to bear the costs of bypassing for an acute illness (IMCI) than for preventive care (ANC).

This study has some potential limitations that may limit the generalizability of its findings. First, our study is based on cross-sectional data and therefore it is impossible to make causal claims no matter how strong the effect sizes are. Second, we do not explicitly assess patients' perception of healthcare quality, rather we make the assumption that a patient, in some way, arrives at this perceived value based on certain indicators and our findings seem to support this fact. However, while it is possible to argue that patients might arrive at this perceived value through other routes, our analysis focuses on specific health facility characteristics to understand if they reliably predict bypassing behavior. In that way, our findings provide value for the health policy maker or health manager seeking to understand what health facility quality measures might increase uptake of services by attracting additional patients. Third, our study uses a facility-based patient data that captures the facility that a patient bypassed-into but does not capture the other facilities that a patient bypasses for that episode of care. This could potentially cause bias as it is impossible to compare the quality of care at bypassed facilities with facilities bypassed-into. The results must therefore be interpreted in this light. However, if we believe the active patient hypothesis proposed by Leonard (17), then it is safe to assume that if patients are making decisions based on quality of healthcare, then on the average, health facilities with higher quality of care would have higher numbers of bypassers. Fourth, our data did not sufficiently capture the environmental organization of healthcare delivery in each country. Studies have shown that in most countries, healthcare service delivery is organized differently in different geographical regions and therefore findings may reflect these differences rather than the influence of quality on bypassing. We try to address this with our sub-group analysis of rural and urban regions, but do recognize that other geographical differences might still exist. Finally, omitted variable bias arising from the uniqueness of our dataset must be taken into account in the interpretation of our findings. Our study did not capture some variables that have been found to be important determinants of health facility choice. These include cost of seeking care, travel time, health facility fees, health worker density, opening times etc. Nevertheless, our findings still provide important information that would be useful in understanding bypassing behavior for both ANC and acute sick-child care in the countries studied. By asking the question, "what is it that makes some health facilities attract bypassers and others don't", we might begin to understand user behavior better.

4.5.3 Implications for policy

Our findings have several important implications for policy and research. We have shown that healthcare facilities that score higher on the General Service Readiness Index Scale developed by the World Health Organization attract more bypassers. We also showed that this effect remains after controlling for other factors such as observed technical quality and other health facility characteristics. Based on this finding, it is reasonable to assume that equipping all health facilities to achieve the WHO service readiness guidelines will at the very least decrease the cost of seeking healthcare for many patients. But it also has the potentials to do more, such as improving uptake of health services, reducing complications, and improving overall population health.

Furthermore, the lack of statistical significance for technical quality in predicting bypassing behavior, though important, should not be assumed to be true for all healthcare delivery situations. While evidence exists to support our findings of no significance, there is also evidence that expectations of technical quality influences health facility choice. The usefulness of our finding is in the relative consistency with which structural quality (rather than technical quality) predicts bypassing behavior.

Education plays an important role in health facility choice. We show that the more educated patients and caregivers are more likely to bypass into higher quality health facilities which might indicate their more selective nature. But our data did not allow us to determine if education made people better able to assess quality of care, or if it afforded them the means to more easily bypass poor-quality health facilities. Regardless of the reason, this finding raises concerns of equity if the organization of healthcare makes the poor more prone to using poor quality healthcare. It is also an important area for further research on the socio-economic differences in patient assessment of quality and in ability to bypass.

We found evidence that patients seem to make health seeking decisions based on certain proxies for quality such as private-ownership versus government-ownership or hospitals vs. non-hospitals. In the countries studied, bypassing occurred more frequently in privately-owned facilities compared to government-facilities all things being equal. This suggests that patient population might perceive the quality of care in private facilities as higher than in government-facilities. If true, it is an important consideration as countries move on towards achieving universal health coverage. Expanding services that patients already prefer would potentially lead to faster progress than scaling up services they don't prefer.

Our study addresses patient bypassing behavior based on the assumption of a direct link between objective measures of quality of care and patient-perceived quality of care. We have reason to believe that this is true and many studies agree (17, 26, 27, 44, 45). These studies also show that not all objective measures of quality factor into a patient's perceived quality and that patients place different weights on each. However, we could not find any studies that directly assessed the links between the objective measures of quality we adopted in this study, and patient perception. Further studies to establish this linkage will be required and will contribute significantly to the field.

4.6 Conclusion

We explored the link between patient-perceived quality of healthcare and bypassing behavior. Our findings show that visible characteristics of health facilities, what we describe as structural quality, was a significant predictor of bypassing but that technical quality was not. In addition, we found that private-health facilities and hospitals were more likely to have bypassers than government-owned health facilities and non-hospitals respectively. Finally, we also found that bypassing is more common among the more educated, and in urban areas which both reflect other important factors that influence patient health-facility choices.

4.7 Citations

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Chapter Five:

Conclusion

Relatively few studies have tried to understand how health policy changes affect a patient's subjective assessment of healthcare quality, or how these assessments influence health-seeking behavior is challenging in resource-poor countries. This is partly because historical approaches to health reform in many developing countries have focused on improving objective measures of quality, not understanding subjective measures, or on expanding coverage of services not understanding the dynamics of service uptake. Yet policy makers have to make decisions all the time that might influence patients' perceptions of quality of healthcare or their decisions to seek healthcare, stay on healthcare, or fully comply with treatment instructions.

To this end, my dissertation addressed three important policy-relevant questions related to subjective assessments of healthcare quality within the context of four important service delivery environments: integrated management of childhood illnesses, antenatal care, postnatal care, and HIV service delivery. In two studies, I explored the impact of key policy changes on patient perception of different domains of healthcare quality, while in the third study I explored the relationship between different measures of perceived quality and decisions to bypass healthcare centers when seeking healthcare. All three studies focused on health systems in low- and middle-income countries.

Chapter 2 described a step-wedged cluster randomized controlled trial that explored the impact on patient satisfaction, of switching from the threshold-based initiation of HIV treatment (standard of care) to early access to Antiretrovirals for all (EAAA, or 'Universal Test and Treat', or 'Treatment as Prevention') in fourteen health facilities in rural Swaziland. The results showed no statistically significant impact of EAAA on patient perception of quality of healthcare measured across all in all dimensions.

Chapter 3 also describes a step-wedge cluster randomized controlled trial. In this trial, I explored the impact of a quality improvement (QI) intervention on maternal perception of the quality of postnatal care in seven PHC clinics in South Africa. We found no statistically significant difference in satisfaction following introduction of the QI intervention. We also observed a time trend with improving patient satisfaction over the timespan of the study. These results suggest that the initiation of the QI policy may have triggered processes that led to improvement in satisfaction over time but the specific components of QI implementation at the PHC clinic level were insufficient to cause a significant difference between satisfaction scores of PHC clinics in the QI intervention periods and PHC clinics in the control periods.

In chapter 4, I explored the association between different measures of patient-perceived quality of healthcare and their decisions to bypass healthcare facilities when seeking antenatal care or acute care for a sick child. It tested different measures of perceived quality including technical quality (from observed patient-provider interactions), structural quality (from health facility service readiness assessments), and health facility labels such as hospital vs. non-hospital and privately-owned vs. government-owned. The results showed that for both IMCI and antenatal care, structural quality was a significant predictor of bypassing behavior but technical quality was not. It also showed that health facility labels (hospitals, and privately-owned) were significant predictors of bypassing behavior. Furthermore, we found differences in bypassing behavior by educational status, severity of medical condition, and location of health facility in rural vs. urban areas. These findings suggest that patients rely more on visible characteristics of the healthcare facility in assessing quality and these influence their decisions on where to seek care.

All three studies make important contributions to existing literature by contributing to the lack of evidence in this space. They all adopt rigorous scientific methods, address important policy questions, and focus on relatively poor regions of the world where evidence-generation is typically hard. To my knowledge, despite the fears expressed in the literature about possible negative impact on patient care with the rollout of EAAA (1), this is the first study to investigate the link in a randomized controlled trial. In addition, despite the acclaimed importance of postnatal care (2, 3), and the global movement towards patient-centered care (4), our QI trial is the first RCT to test the impact of QI on patient perception of quality of care in a postnatal care setting in a developing country. Furthermore, our investigation of the relationship between perceptions of quality and bypassing behavior adopts a cross-country and multiple services approach thereby contributing to existing studies that investigate the phenomenon within specific countries or specific regions of selected countries.

Beyond the immediate implications of our findings for improving health policy decisions, our findings also have larger policy implications in this era of Universal Health Coverage (UHC). At the micro-level, patient perceptions influence important decisions about: whether to seek care an illness, where to seek care, when to seek care, and for how long to remain on care (5-9). These decisions are made all the time and are significantly influenced by several factors including quality perceptions. History has shown that simply making services available in not sufficient to ensure optimal uptake of the same services. If perceptions of quality and satisfaction with care are not addressed, use of the services provided will be less than optimal (e.g. childhood immunization, skilled birth attendants, and postnatal care). Therefore, policy makers and health service delivery managers should and must pay closer attention to patient perceptions and satisfaction.

At the macro level, UHC will require several health policy changes that may result from (or be caused by) subjective measures of quality such as patient satisfaction. History has also shown that dissatisfaction with existing health systems serves as catalysts for change, while satisfaction makes it easy to maintain the status-quo. This was true in countries like Ghana (10), Nigeria (11), Turkey (12), and Mexico (13), to name a few. Therefore, policy makers in the era of UHC must pay close attention to patient perceptions and satisfaction with the quality of care the health systems produces as a whole. This is important because despite the good intentions of policy makers, policy changes that cause dissatisfaction to a significant fraction of the population would run the risk of being reversed.

In summary, this dissertation has highlighted several key issues about patient perceptions of quality and use of health services. It has also highlighted the need for continued research to better understand the upstream factors and downstream effects of user perceptions of quality. In this era of rapid expansions of health service coverage, reliable information and evidence is needed in order to ensure optimal uptake of health services, and longevity of health reform efforts.

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